THE BOOK of KNOWLEDGE

HOW YOU CAN TAKE YOUR OWN PICTURE

(A) Roll of Sensitized Paper
(B) Governor Controlling Operation of Lens, Shutter and Feeding of Paper
(C) Lens and Shutter
(D) Coin Operating Mechanism
(E) Switch Controlling Magnets, Coin Slot Locking, Pilot Light and Paper Cut-off Device
(F) Paper Cut-off Mechanism
(G) Motor Controlling Drive for Governor, Developing Tank and Dryer
(H) Relay Panel and Fuse Box
(J) Developing Tank
(K) Replenishing Tank
(L) Overhead Flood Lights
(M) Water Inlet for Washing Pictures
(N) Cooling Tube from Refrigerator Unit
(O) Drying Unit
(P) Picture Delivery Chute

The inventor's right hand, in this picture, is over the slot for the coin.

THE photomaton operates on the principle of a vending machine. You sit in a booth facing the lens and drop a coin into a slot. When the coin is deposited it makes an electrical contact which turns on the flood lights and starts the machine going. The shutter of the lens opens and closes eight times with a few seconds' interval which permits the sitter to change pose or facial expression. The exposures are made directly on the sensitized paper which is carried on a belt past the lens. The paper is then carried down into the developer, through other chemicals, and water, into an electric dryer. By use of a special chemical process, the exposures are developed as positives instead of negatives. The strip of eight finished sepia photographs is immediately and automatically delivered. The entire process takes eight minutes. Our illustration shows the inventor, Anatol Josepho, a young Russian, at the machine. The strips of eight portraits show the type and variety of photographs taken by the photomaton. The field for its use, aside from personal souvenirs, is wide—passports, licenses, identification cards, commutation tickets, etc.—and the cost low.

The
BOOK *of* KNOWLEDGE

The Children's Encyclopedia

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DEPARTMENTS

The Earth	The United States
Stories and Legends	Familiar Things
All Countries	Our Own Life
Golden Deeds	The Fine Arts
Helps to Learning	Men and Women
Literature	Poetry and Rhymes
Animal Life	Plant Life
Famous Books	Things to Make
Dominion of Canada	and Things to Do

Book of Wonder

VOLUME XVIII

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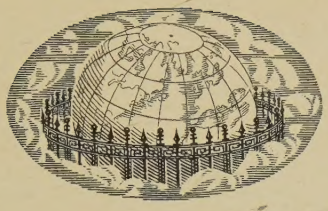

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Photo, courtesy Denver & Rio Grande Western Railroad.
"Edwin" Natural Bridge in southeastern Utah. The span is 194 feet long.

THE WESTERN STATES

PART I

CONTINUED FROM 6337

BOYS and girls, as well as fathers and mothers, like to read about the West. They enjoy tales about the brave men and women who left their homes in the East to make new homes in a distant and almost unknown land. Then, too, accounts of the deeds of such men as "Buffalo Bill," Jim Bridger and Kit Carson are always welcome. These men are not story-book people, as many think, but were actual men who had a part in making the West what it is to-day.

The country interests us quite as much as the people. We know from pictures, if we have not been there, that there are wonderful and interesting things to see in the West. Mother Nature has filled the Western country with attractions. The highest mountains, the deepest valleys, the biggest trees and the largest deserts are to be found in this part of our country. The boys and girls of no other land have such a fine variety of things at home as have we.

In Revolutionary times western New York and Pennsylvania were "the West." As population advanced the West was pushed back, until now we generally mean the vast region that lies approximately to the west of the 100th meridian. It includes the Western states, that is, Washington, Oregon, California, Idaho, Nevada, Utah, Arizona, Montana, Wyoming, Colorado and New Mexico.

Long before the English settlers came to America the king of Spain considered the country to the west of the Mississippi River a part of his empire, but neither he nor any of his people had much idea of the vast extent of this possession. Some fearless Spanish explorers wandered over the country, mainly in what is now Texas, New Mexico and Colorado. Others sailed along the Pacific coast and sent parties into what is now California. These adventurers returned to their strongholds in Mexico and Spain with but hazy ideas of the country they had "explored." The maps which they drew look like curious pictures to American school children of to-day.

Although the Spaniards as a people did not settle this part of their empire, the Spanish influence is to be seen in our Southwest to-day. Many of the houses now built by people in New Mexico, Arizona and California are of Spanish design or are based upon it.

Many public buildings, as, for instance, those on the campus of the University of New Mexico in Albuquerque, are like buildings in old Mexico and Spain. In southern California Spanish priests built missions with the hope of Christianizing the Indians. These missions consisted of groups of structures built in plain Spanish style inclosed by high walls. Some of the missions are still in operation, and thousands of tourists visit them every year.

After a time French, British and American explorers and fur-traders went into the region west of the Mississippi in search of new lands, new riches and new pelts. These men were brave and fearless, but they cared little about settling the land. They made it easier, however, for the people who came after them and took up the land and made permanent homes. The fur-traders went far into the West, even to the Rocky Mountains, by way of the Missouri, Platte and Arkansas rivers. These rivers and valleys were then natural routes for this trade, just as to-day roads and railroads follow along them.

The fur-traders did not hunt and trap the animals, but bought the furs from the Indians. Instead of paying for them in coin, they exchanged articles such as beads, trinkets, guns and "fire water" for them. The Indians were not always friendly toward these traders, and we cannot blame them much for this because they were merely trying to keep the white man from taking land which they thought belonged to them. Having secured a large number of furs, the traders returned and sold them in cities or fur-trading posts. It was at this time that St. Louis became a fur-trading post. Even now the city of St. Louis is the centre of fur-trading in this country, although there are so many other larger industries in the city now that few people know that it is a fur centre.

How the United States came into possession of the West

Some of the present West became a part of our country in 1803, when President Jefferson made the Louisiana Purchase from France. At that time few people realized the vast extent of our West. Napoleon seems to have sensed the great size of the land. He said: "A magnificent bargain—an empire for a trifle. . . . The day may come when the cession of Louisiana to the United States shall render the American people too powerful for Europe." President Jefferson said that the land was a barren waste and that he bought it mainly to have control of the Mississippi River.

He did not know the extent of the land he purchased, and certainly he knew nothing about its great resources. That the people of our country might know more about the vast territory they had purchased he sent two explorers, Meriwether Lewis and William Clark, on an expedition to the Pacific in 1804. Fur-traders and Indian guides led them up the Missouri River to the Rocky Mountains, across these by passes to the Columbia River, and down the Columbia to the Pacific. They were gone over two years on this trip and brought back an immense amount of information about the country they passed through. Little of the wealth of the West was known, however, until the pioneers came to make their homes there. In fact, much is yet to be learned.

On a monument in Sioux City, Iowa, there is a bronze plate with the following words:

In Commemoration
of the
Louisiana Purchase
Made During the
Administration of Thomas Jefferson
Third President of the United States
April 30, 1803
Of Its Successful Exploration
By the heroic Members of the
Lewis and Clark Expedition
of the
Valor of the American Soldier
and of the Enterprise
Courage and Fortitude of the
American Pioneer
To Whom the Great States
West of the Mississippi River
Owe Their Secure Foundation

The work of the gold-seekers

In these thoughts the American pioneer is given great credit for the making of the West. This praise is well deserved. The pioneers went out into the West either to look for new land for farms or to seek gold in the mountains. The pioneers who were of the most benefit to their country were the ones who made homes on farms, because they were the real settlers. On the contrary, many of

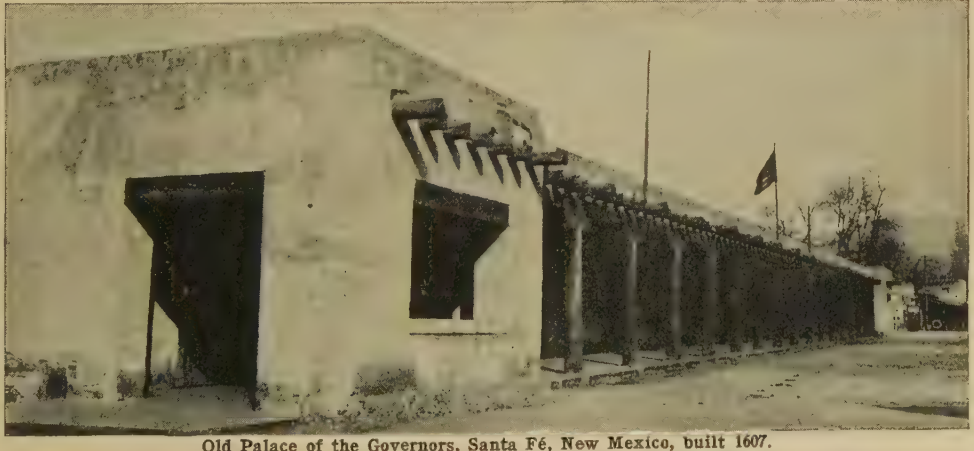
INDIAN AND SPANIARD IN THE WEST

Photo, Ewing Galloway.
Casa Grande, the ruins of an ancient Indian village in Arizona. The roof of course is modern.

Spruce Tree House in Mesa Verde National Park. This ancient home of the cliff-dwellers originally had 114 rooms.

Photo, Ewing Galloway.
Mission of San Xavier del Boca at Tucson, Arizona.

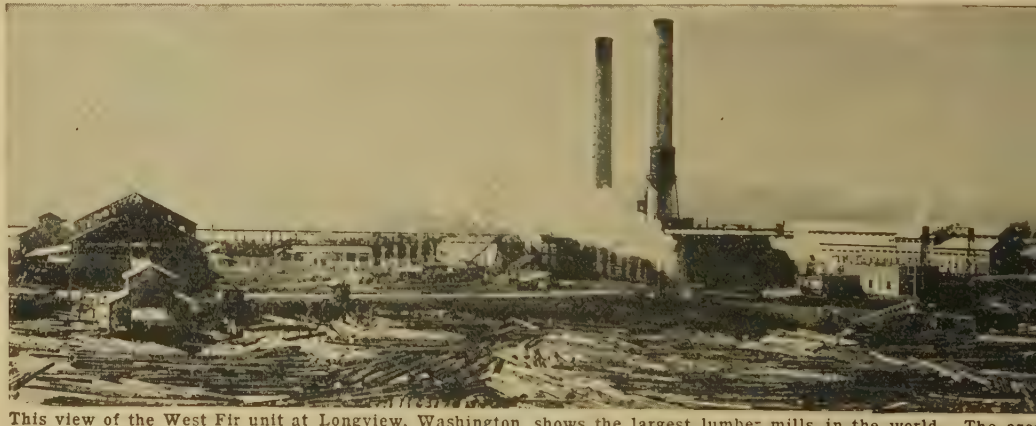
Belfry of the ruined chapel of the Pala Mission near Los Angeles.



Old Palace of the Governors, Santa Fé, New Mexico, built 1607.

Mesa Verde, courtesy Denver & Rio Grande Western Railroad; Pala, Putnam Studios.

Lumbering is permitted in the national forests, but only under the strict supervision of the Forest Service. The upper picture shows a small sawmill in the Santa Fé National Forest. Below, an Indian is hauling logs to a similar sawmill also in a national forest. Photos, United States Forest Service.



This view of the West Fir unit at Longview, Washington, shows the largest lumber mills in the world. The area are 30 miles of railroad tracks in the yards

Oregon is one of the leading states in the production of lumber, chiefly from the cone-bearing trees. Logging roads are built into the fir forests and bring out logs in great numbers. The pictures opposite show lumbering on a smaller scale. Photo, Arthur M. Prentiss, courtesy Portland Chamber of Commerce.

der roof amounts to 38 acres and the plant covers many acres more. It is operated entirely by electricity. There d 6 steamers at once can load at the docks. Photo, courtesy Long-Bell Lumber Company.

the gold-seekers who went to California and all parts of the West after the discovery of gold on the site of the present city of Sacramento in 1848, cared little about staying in the West after they had secured a fortune. Like the fur-traders, however, they, too, were pathfinders and made it easier for the pioneer settlers to find their way across mountain ranges and deserts to the fertile tracts of the vast West. Many gold-seekers did stay, and they became farmers, merchants, mine-owners and artisans. In fact, the growth in population in the West dates from the discovery of gold in California.

About 1850 gold was discovered in the mountains near Pike's Peak, which is not far from Colorado Springs. When news of this reached the East great numbers of people set out across the plains for what they called the "Pike's Peak country." Some of the gold-seekers printed on their wagons: "Pike's Peak or Bust!" It was soon learned that although there was gold in the mountains, it was not nearly so common as had been reported. Some of the people who had written on their wagons: "Pike's Peak or Bust!" returned with the words: "Busted, by Gosh!" Many of those who went to Colorado to seek gold, however, remained to farm the land, and thus became real settlers.

The coming of pioneer settlers

All the dangers were not banished when settlers began to go West. In fact, some of them had reached the Pacific coast in Oregon before the discovery of gold in California in 1848. A single family dared not make the long trip across the deserts, plains and mountains alone. For this reason it became the usual thing for families to collect at gathering-places along the main trails and wait until twenty-five or fifty or more families were ready to set out. By uniting in this way they could better defend themselves against prowling Indians and could help each other over difficult places on the way—for there were a great many difficult places, especially when the trails crossed rivers. These had to be forded—a difficult task in any case, but dangerous during times of flood. Many of the possessions which the families had brought with them, such as articles of furniture they hoped to start the new homes with, had to be thrown away in trying to get a wagon across some of the swollen streams. The moving picture The Covered Wagon tells the story of their hardships quite accurately.

The trail of the "covered wagon"

Independence, Missouri, was a favorite starting-place. As the railroads were built into the West the assembling-point moved to the end of the railway or to a point where important trails met. One of the largest parties started from Independence for Oregon early in May, 1843. The route crossed what is now Nebraska along the course of the Platte River. Nebraska was not a state then, for at that time Texas was the only organized state west of Missouri. The trail led to Fort Laramie, near the present city of Laramie, Wyoming, through the "Indian country." Fort Laramie was an American trading-post. Then the trail followed the course of the Sweetwater River, which finally brought the travelers to South Pass. South Pass was for a long time the only known way to get to the Oregon country.

The journey to Oregon took five months, nearly half a year. Think of all that happens during five months in your home, in your school, and imagine how long and hard the way was for these brave people struggling on in the face of many hardships and without the comforts that you enjoy every day.

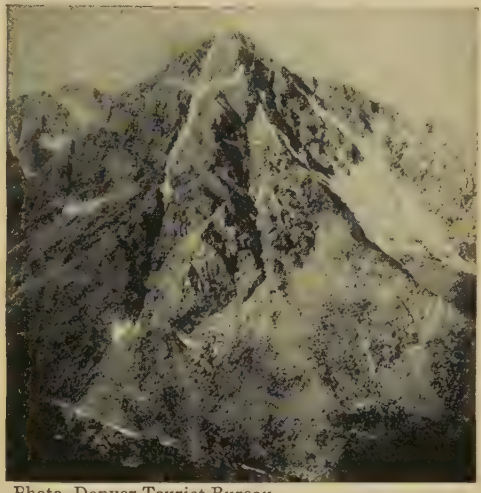
The Mormons go to the Great Salt Lake

In 1847 the Mormons followed the same trail through South Pass, and a little beyond turned southwest. When they arrived at Great Salt Lake they set to work making homes, but it was necessary to build irrigation dams and ditches to provide water enough to raise their crops. The Mormons were the first white people to succeed in irrigating land in this region. The settlement at Great Salt Lake helped other people on their way to the Pacific coast, for the Mormons soon could sell food to the travelers. Salt Lake City and the surrounding country is now the centre of the powerful Mormon church.

The other great trail across the western country was the Santa Fé Trail. This route led from Independence into the Southwest—to Santa Fé. This was a great trading-route, traveled back and forth many, many times by merchants

Idaho has many scenes to delight the eye. Here we are looking down the Big Salmon River from a point below Lucile, in Idaho County in the western part of the state. © Barker Studio.

Photo, Denver & Rio Grande Western Railroad.
Grand Canyon of the Arkansas River, Colorado.



Photo, Denver Tourist Bureau.
Mount of the Holy Cross, west of Denver.

Puget Sound is an unusual body of water of large size, irregular shape, and of great depth in many places. This is a view among the San Juan Island Group, a picturesque region.

who had goods to sell to the Mexicans at Santa Fé. The Oregon Trail was different, you see, because it was mainly a route used by pioneers going into the West to make new homes.

THE NEED FOR A MAIL ROUTE

As more people came to the West there arose a great need for a regular mail route across the country. In 1856 the Government brought some camels from the Sahara in northern Africa, thinking that they could be used for the trips across the plains, but they were never actually used to any great extent. Soon regular stages drawn by horses began to make the trips. One stage was driven a certain number of miles and then the horses were changed. Many changes like this had to be made in the long distance between St. Louis and San Francisco. A letter mailed at one of these places usually arrived at the other in twenty-five days. Later on the "Pony Express" began to carry the mail across the plains and mountains. This was a private enterprise. Fast riders on fast ponies sped over the miles, riding so swiftly that they could go only ten miles before the pony was exhausted. Then a fresh pony took the mail at top speed for ten more miles, and so on. This cut down the number of days between the Mississippi River and the Pacific coast, but it was a very expensive way to send letters, because the postage was $5 in gold for each quarter of an ounce. The pony-express riders had many thrilling adventures, which you can read in books about the West. "Buffalo Bill" started his long and interesting western career as a pony-express rider.

THE FIRST RAILROAD TO THE PACIFIC COAST

The pony express carried the mails for only two years, and then was no longer needed because telegraph lines had been laid across the country. A short time after the close of the Civil War the first railroad, the Union Pacific, was completed across the West. The building of this railroad was a great task, and its opening was the occasion of great rejoicing and ceremony. The railroad was built, at great expense, across the grassland and desert country and through the passes in the mountains. Here and there tunnels had to be built. Later other railroads were built to the Pacific Ocean. It so happens that there are three natural passageways through the mountains—one in the northern, one in the central, and one in the southern section of the West. Partly for this reason there are three great railroad routes to the Pacific. Railroads now carry thousands of passengers in comfortable cars across plains, mountains and deserts where not so very long ago the pioneers struggled with their covered wagons, fought Indians, and sometimes perished on the way.

THE GREAT PLAINS REGION

If you look at the map you will see a long line of big states which starts in the north with North Dakota and ends in the south with Texas. In between these two states lie four others—South Dakota, Nebraska, Kansas and Oklahoma. Traveling from the east, you would not really be in the West, as you have been told, until you reached the western parts of this long line of states. Look at the map again closely and you will see that a certain longitude line, the 100th meridian, cuts across these states. That is why they are often called the "100th meridian states." But it is even better to call them the "plains states," because the words tell us a great deal about the scenery and the way people live there. The surfaces of these states are so flat, especially toward the west, and have so few deep valleys in them, and they cover such a large area, that they are called the "Great Plains." The eastern parts of the Rocky Mountain states—Montana, Wyoming, Colorado and New Mexico—are also of the same character.

HOW FARMING IS CARRIED ON WHERE THERE IS LITTLE RAIN

The Great Plains gradually slope up to a height of almost a mile above the level of the sea in eastern Colorado and Montana. The land becomes drier and drier, until near the mountains there is hardly enough moisture to grow crops. Crops are raised in the Great Plains either by irrigation or by dry farming. The "dry farmer" has to work very hard to raise crops, and he would like to turn water on the land, as people do when they irrigate. However, irrigation is often impossible and the dry farmer must do the best he can with the rain which falls naturally. He does not plant a crop in each field every year. Some fields are plowed and cultivated but left without seeds. This is called "summer fallow-

TWO BEAUTIFUL WESTERN VALLEYS

A prune orchard in the Santa Clara Valley in spring is bewildering in its loveliness, and there are miles and miles of them. The valley itself is really an extension of an arm of San Francisco Bay and is the most productive of all the Coast Range valleys. Photo, courtesy Southern Pacific Lines.

East of the Cascade Mountains the rainfall in Washington is likely to be deficient, but under irrigation marvelous results are obtained. This smiling landscape is Wenatchee Valley, in Chelan County, in almost the exact centre of the state. The river itself flows into the Columbia. This is the land of the apple and produces the beautiful fruit you know. © Asahel Curtis.

ing." When it rains a great deal of the water seeps into this soil. Stirring up the soil is also found to prevent a great deal of water-loss through evaporation. When in the next year he plants a crop in these same fields the crop receives the benefit of two years' rain rather than that of only one year. The farmer also tries to plant crops whose natural homes are in dry lands. A corn called Kafir corn and a grass called Sudan grass, both from dry climates in Africa, are examples.

We tell you about methods of irrigation in the story beginning on page 2543. A very good place to see irrigated fields is around Greeley, Colorado, which is one of the oldest irrigated settlements in our country. The city was named for Horace Greeley, an eastern man and a great newspaper-editor, who was a great friend of the West. A famous saying of his was, "Go West, young man, and grow up with the country." The first settlers in Greeley came from New England in 1871. They were the first people in this country to irrigate the higher lands along the river rather than the lowlands.

WHY TOURISTS GO TO THE ROCKY MOUNTAINS

Every summer thousands of people spend a few weeks in the Rocky Mountains. Denver is a great tourists' city, and so is Colorado Springs. These cities lie where the plains and the mountains meet, and there are many smaller cities located at similar points. One of the greatest industries in Denver is the entertainment of these summer tourists. People like especially to go into the national parks, of which most are in the West. (See page 2281.) Rocky Mountain National Park, near Denver, is about 500 square miles in area and is beautiful mountain country. The "Continental Divide"—the ridge which separates the streams flowing into the Pacific and Atlantic oceans—cuts across this park.

The Rocky Mountains are in most places covered with trees up to the timberline, and many of these forests are owned by our Government. We tell you of them in the story beginning on page 2803. In the mountains the snow stays late into the summer, and in protected pockets where the snow piles up year after year and does not melt in the summer are found glaciers. In northern Montana in the Lewis Range of mountains there are more than fifty glaciers, large and small. In 1910 the land in this region was set aside by the Government for another park, to which was given the name Glacier National Park.

THE CHARACTER OF THE ROCKY MOUNTAINS

It would be a mistake to think of the Rocky Mountains as one great wall of rugged country. On the contrary, there are many places where the plains extend into the mountains much as the ocean sweeps into great bays along a seacoast. In central Wyoming there is a break in the mountains made by one of these great seas of plains. Some ranges of the Rockies stretch out into the plains as peninsulas do into the ocean. Such, for example, is the character of the Big Horn Range in Wyoming. Inclosed within this arm is the Big Horn Basin, where people have discovered oil in the rock beneath the surface, and where much land is irrigated. There are many other places along the edge of the mountains where derricks tell of the presence of oil wells, and there is also oil shale in Colorado.

Within the mountains there are many wide valleys which are favored locations for small towns. In Montana there is the great valley called Rocky Mountain Trench, and in Colorado there is a series of "parks" called North, Middle and South parks. These are natural parks, and should not be confused with the national parks.

Mining towns are numerous in the Rockies. Towns have sprung up in places where precious metals such as gold, silver, copper and lead have been found. Leadville, Colorado, is the highest town in our country—over 10,000 feet above the level of the sea. It is located near mines which are rich in gold, silver and lead. There are many ruins of mining towns in the mountains, too, abandoned because the ore finally gave out. There are also many holes in the ground where there never have been any villages. These tell their story of prospectors searching in vain for the precious metals and finally giving up the search. Some of the mining camps grew up in a few weeks and lasted not much longer. When the metal is gone there is nothing to keep the people in these mountain villages. At the same time some mining cities, such as Butte and Anaconda, in Montana, and Bisbee, in Arizona, have thrived.

THE NEXT STORY OF THE UNITED STATES IS ON PAGE 6613.

FLOCKS AND HERDS IN MONTANA

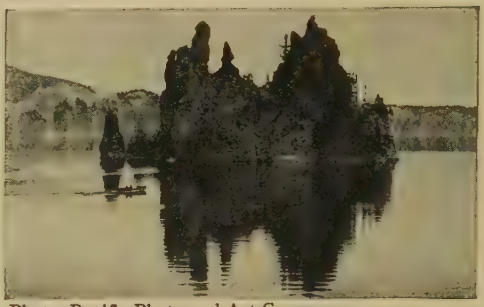
In earlier days stock-raising was almost the only industry in Montana, and while other industries have developed, stock-raising is still important. This is a view of the Nine Quarter Circle Ranch and shows cattle out on the range as far as the eye can see. © Albert Schlechten.

The state ranks higher in sheep than in cattle. Here we see sheep of excellent quality wintering on the shores of Flathead Lake, in the northwestern part of the state, with the snow-covered mountains not far away. The lake itself is about thirty miles long.

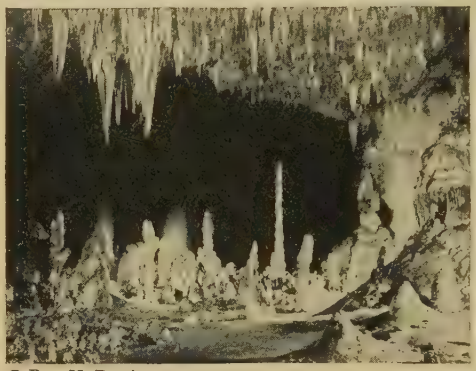
Photos, courtesy Department of Agriculture, Labor and Industry.

HERE AND THERE IN THE WEST

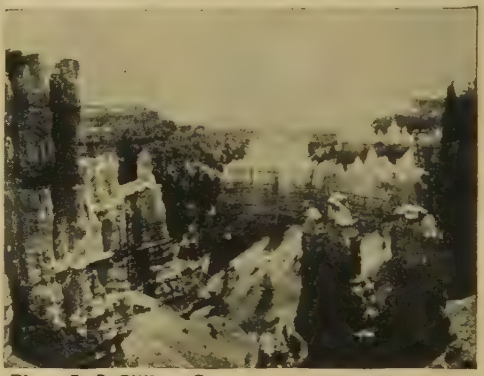
Photo, courtesy Chamber of Commerce.
Big Horn Hot Springs, Thermopolis, Wyoming.



Photo, Pacific Photo and Art Company.
The Phantom Ship in Crater Lake, Oregon.



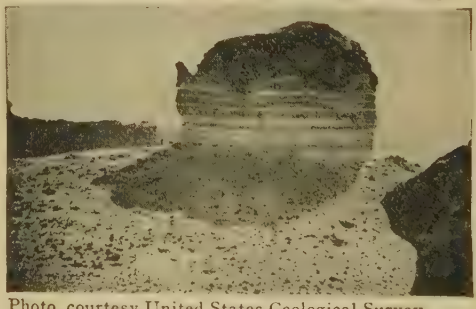
© Ray V. Davis.
"Totem Poles" in Carlsbad Cavern, New Mexico.



Photo, L. S. Gillham Co.
Bryce Canyon in southern Utah.

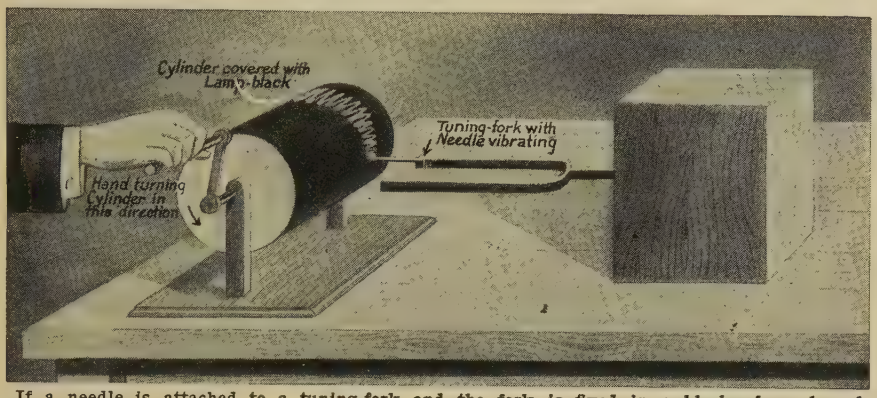
© Keystone Photo Service.
Mount Wilson Observatory, Los Angeles County.

Photo, Denver & Rio Grande Western Railroad.
On top of Pike's Peak, Colorado.



Photo, courtesy United States Geological Survey.
Teapot Dome, Wyoming.

Photo, courtesy Californians Inc.
Seal Rocks, San Francisco.



If a needle is attached to a tuning-fork and the fork is fixed in a block of wood and then struck, the vibrating needle will draw a wavy line on a slowly revolving cylinder.

MUSIC AND NOISE

CONTINUED FROM 6316

WE know that sound-waves agree in many ways with other kinds of waves, like the waves of the sea or the waves of light. We must now go on to study the nature of these sound-waves; and the first thing we discover is that they differ from other waves in one highly important respect.

In the sea the wave runs along the surface, but the movements of the water, which make the wave, are not at all along the surface of the sea; they are up-and-down movements. Of course, it looks to our eyes as if the water were really running along, but it is not; the wave is running along; the water itself is only rising and falling.

The proper way of saying this is that the vibration is at right angles to (or away from) the line of the wave. The wave is moving along in one direction, and the particles of water which make the wave are moving at right angles to that direction. They are moving, not along, but up and down. The movement might just as well be from side to side, but in any case it is a *transverse* vibration—that is to say, a vibration across. Now, what we have learned about the waves of the sea is true of the waves of light; but it is not true of sound-waves. The great point about sound-waves is that the movement of the air, or whatever the medium happens to be, is not at right angles to the path of the wave, but is a movement to and fro in the line of the wave. Let us think of a stretched string that is vibrating and imagine it is giving a little series of blows to the air that is next to it.

That is the way a sound-wave is started. When the air is tapped it is squeezed, but it is elastic, and in between the taps it springs back, and so it is alternately condensed and expanded, and the wave is made up of these to-and-fro movements of the particles of air in the line of the wave.

It is really not difficult to form in our minds an accurate picture of the way in which the wave travels. All we need do is to place on a table a row of billiard balls, all touching one another. Suppose we now roll another billiard ball against the ball at one end of the row. Each ball in turn is squeezed and passes the pressure on to the next one, with the result that the ball at the other end of the row is shot out by itself. Each ball in turn is pressed and relaxed. That is what happens to the air when a sound-wave travels through it, and we may imagine that the wave is made to travel by

particles of air bumping against one another in their to-and-fro movement, as the billiard balls bump each against the next.

That is all we need know about the nature of sound-waves, but the next question we may naturally ask is, What makes the difference between the sounds we call noises and those we call musical notes? Or, in the case of a modern piece of music full of discords, what marks the line between music and din?

Well, the case of music teaches us that there is no sharp and absolute line to be drawn between noise and music, as there are many sounds and combinations of sounds which are pleasant and musical to one ear and unpleasant to another. Nevertheless, though there is room for difference of opinion at the margin between the two kinds of sounds, we can answer without hesitation that the difference between what everyone would call a noise and what everyone would call music, depends on whether the waves making the sound are regular or irregular.

THE SHAPE OF THE MUSICAL SOUNDS OF AN ORCHESTRA

When we take a rich and complicated musical sound made by a large orchestra, the resulting wave is regular and yet irregular. The ear of a child, or any untrained ear, may not perceive the regularity, and to such an ear the sound may be a noise; but the ear of a musician may perceive that the sound really is regular and has a definite shape. Also, there may be room in music sometimes for sounds which are partly regular, and therefore musical, and partly irregular, and therefore noise. Certain of the metal and drum-like instruments which are struck in the modern orchestra owe their value to this mixture of noise and music.

We do not really know why waves which strike the ear in a regular way should be called pleasant and why those which are irregular should be called unpleasant; but it seems natural that a regular, even, steady flow of impulses into the hearing part of the brain should be pleasant, and we can imagine why it should be unpleasant for the nerve-cells to be disturbed by waves without order or rhythm, all mixed up together. Perhaps we may fairly compare the difference between the effects of music and noise to the difference between rocking a baby and shaking it.

We need say little more about noise, because, as it is made by irregular waves, there is not very much that is definite to study; and, on the other hand, there is a great deal to study when we look at definite, regular waves which make musical sounds. Perhaps the only other point worth noticing about noise is the very marked power of unexpected noises upon the brain. This effect of noise in making us jump or start is, doubtless, in its origin very useful, warning men in natural mode of life and the lower animals of the approach of enemies or of some other kind of danger.

THE POWER OF THE EAR TO DISTINGUISH BETWEEN VARIOUS SOUNDS

Loudness of sound depends on the size of the waves that cause it. The proper word in this connection is not size, but *amplitude*. The greater the amplitude of the waves, the louder the sound. If sound-waves were like water-waves, then a very faint sound would correspond to a little ripple, and a very loud sound to waves "mountains high." There is something to be added to this, however, because, when we use such a word as loudness, it is evident that we have to reckon not only with what is outside the ear, but also with the ear itself. Now, it is the fact that if we take notes of various pitch, high and low, all having the same amplitude of waves, they do not sound equally loud. Thus, though it is true that the loudness of a given note depends on its amplitude, when we compare different notes we find that if the amplitude is all the same, the higher in pitch they are, the louder they sound. In other words, our ears are more sensitive to high notes than to low notes. From the point of view of music this is extremely important. It means that when we are listening to voices singing together, or to something played on the piano, our ears always give more value to the higher notes than to the lower ones.

WHY HIGH NOTES ARE ALWAYS HEARD BETTER THAN LOW NOTES

The basses, the tenors and the contraltos, for instance, may be making as much sound as the sopranos, but we hear the sopranos best. That is why the sopranos are usually given what we call the tune to sing, while the basses, tenors and contraltos are given only something which accompanies the tune.

So when we are playing the piano, if

the tune is in the top notes of the right hand, we can use both hands and all our fingers with equal force, and the tune will stand out clearly to the ear, because the ear is more sensitive to high tones. But sometimes a piece is written with the tune for the left hand and the accompaniment for the right hand. In such a case, if both hands play with equal force, we shall not hear the tune properly, but shall hear a meaningless accompaniment. The player, therefore, must in such a case play lightly with his right hand, and pick the notes out strongly with his left hand, as the ear is more sensitive to high than to low notes.

On the other hand, it is very interesting to observe that, so far as the startling, or fear-producing, effect is concerned, low notes are more powerful than high ones. The sudden sound of a flute has no startling quality at all compared with a roll of distant thunder or any kind of sound that resembles a growl. It is very noticeable in babies and small children that a low-pitched voice may frighten them, even though it is heard far less intensely by the ear than a high-pitched voice would be.

How to Draw a Picture of a Sound on a Sheet of Paper

So much for the loudness of sounds. Our next concern is with the pitch of musical tones; and it is easy to show that the difference between a high note and a low note lies in the difference between the number of waves that strike the ear in a given time. It is not difficult to prove this, because we can take a tuning-fork and set it vibrating, and make one of the prongs, or something attached to one of them, scratch a record of what happens on a piece of smoked paper.

In this way we get a line marked on the paper, and may actually count the number of vibrations made in each second by the particular fork. We then find that the greater the number of vibrations, the higher the pitch of the sound. Gradually the tuning-fork ceases to sound, and the note becomes fainter; but its pitch does not alter, however faint it is. If we look at the record made by the fork on the paper we can see the reason for this. The size of the waves steadily lessens as the fork loses its energy, and so the sound becomes fainter; but the number of waves in each second remains the same, however small they are.

How the Siren Is Made to Produce Its Shrill Sound

The best instrument for studying the pitch of musical sounds is called the siren. Siren was the name given to an imaginary kind of being, half woman and half bird, who sang so beautifully that no one could resist her; and it is by way of a joke that the name has been given to the modern siren, which produces notes that certainly could never charm anyone. The siren is an arrangement by which air is blown along a tube; but across the nozzle of the tube there is turning a flat piece of metal with holes in it, so that the air can pass through when the holes come opposite the tube.

If we know how many holes there are, and how often the disk spins in a second, we can tell the number of waves which are being produced to make the sound that we hear. If we begin very slowly there may be perhaps only ten holes coming opposite the tube in a second; that simply means ten puffs in a second.

It is true that we may hear each of these as a little puff; and we do so because each little puff starts something or other vibrating at a rate which we can hear. But the ten puffs in a second, taken together, do not make a sound. However, if the number reaches twelve or thirteen, a few people will hear an extremely deep, low-pitched note, and people with healthy ears should hear a low note when the puffs reach about sixteen a second. As we increase the number the pitch of the note we hear rises until it becomes an intensely high whistle. There may be now thirty thousand puffs or more in each second.

The High-Pitched Notes That Lions and Cats Can Hear

If a number of people are listening, especially people of different ages, it will be found that one after another ceases to hear anything at all, while others still hear an intensely high whistling note. As a rule, it is the elderly people that cannot hear these very high notes. More than a quarter of a century ago Sir Francis Galton made some very interesting experiments on animals with a whistle producing extremely high-pitched notes, and he found that lions and cats were peculiarly sensitive to these notes, though other animals did not seem to be aware of them at all.

THE NEXT STORY OF THE EARTH IS ON PAGE 6695.

Pictures, courtesy United Shoe Machinery Co.

1. Wooden last.
2. Insole.
3. Insole tacked on last and channel made.
4. Upper.
5. Upper on last.
6. Upper tacked on.
7. Welt sewed on.
8. Shank placed.
9. Outsole put on.
10. Sole shaped and channel cut.
11. Sole leveled.
12. Heel put on.
13. Heel trimmed.

The old cobbler in his shop.

THE STORY IN A PAIR OF SHOES

CONTINUED FROM 6373

IF you look at your shoe you will notice three parts, the upper, the sole and the heel. You may think the story these parts have to tell is simple and brief, but when you learn that they may have passed through 160 different machines and 209 different pairs of hands, you begin to realize that the making of a pair of shoes is not such a simple matter as it seems. Let us see how it is done.

All the different kinds of shoes worn at the present time have interesting stories of their own. The "peg" shoe gets its name from small wooden pins, or pegs, which are driven through the soles and uppers to hold them together. The "standard screw" shoe, which is very strong and heavy, has its sole attached to the upper by a threaded brass wire, which is screwed in. The "McKay sewed shoe" took its name from Gordon McKay, through whose interest the McKay Sewing Machine was perfected. The "turn" shoe is now worn by only a few people, but it was invented centuries ago. More important than any of these is the Goodyear welt shoe, which is worn by a great many people and is now considered the best machine-made footwear. Some people still have their shoes made by hand, because they believe hand-made shoes are superior to those made by machinery. Most hand-made shoes command a very high price because of the fine material used and the excellent workmanship. As it is, most hand-made shoes have the outsole stitched to the welt by a machine.

In the early days all shoes were made by hand. The chief tools used were the hammer, lapstone, needle, knife and awl. Tools of this description were used by the Egyptians. They appear in the drawings in a temple at Thebes, built about 1400 B.C., showing the arts and crafts of the time. In any shoe-repairing shop you may still see the shoemaker working with these tools, which have not changed very much. But during the nineteenth century machines were invented for every important process in the manufacture of shoes, and large factories have been established where millions and millions of pairs of them are made every year. In this country few shoes are made except in these great factories.

NEW ENGLAND THE CENTRE OF SHOE-MANUFACTURING IN AMERICA

The first shoemaking recorded in America was by Thomas Baird, or Beard, who arrived at Salem in 1629. He was engaged by the Massachusetts Bay Company to make shoes for the colonists. For this purpose he brought with him different kinds of hides and the various tools. It is recorded that a planter in Virginia in 1636 employed six shoemakers to make shoes for his slaves.

The making of shoes became such an important industry in the early history of the country that laws were passed regulating it. In Pennsylvania in 1721 severe laws were passed regarding the making of shoes and fixing the price to be paid for them. Men were compelled to use good leather and to sell at a fair price. Laws fixing prices were once common, but until recently we had had few of them for many years.

Early in the history of New England, Lynn, Massachusetts, became a shoemaking centre. Philip Kertland, an experienced Welsh shoemaker, came there only a few years after Baird reached Salem, and taught his art to many of the colonists in the vicinity. In a few years Lynn was making many of the shoes then sold in Boston. John Adam Dagyr, another celebrated shoemaker, also settled there in 1750. He secured the best samples of work from abroad and taught many apprentices. The fame of New England shoes, now known all over the world, is due largely to the training given by these men.

HOW A YOUNG MAN LEARNED THE TRADE

Before the introduction of shoemaking machinery the young man who wanted to learn the trade was apprenticed for a term of seven years. He was instructed in every part of the trade, and when he had served his time he became a full-fledged shoemaker and started out for himself. He was called a journeyman, because he journeyed from place to place in search of work. A family needing shoes would engage him to come into their home to make shoes out of their home-tanned leather, and he would remain with them, working until he had made a year's supply of footwear for customers in this way. This was called "whipping the cat," and the custom persisted for a very long time.

A SORT OF FACTORY SYSTEM IS INTRODUCED

A master workman soon realized that he could increase his income greatly by employing other men to do certain portions of the work while he directed their efforts. He could get materials cheaper by buying in large quantities. This gradually led to a division of labor, and was the beginning of the factory system, which has steadily developed since that time.

In 1795 there were in Lynn more than two hundred masters employing over six hundred journeymen, or shoemakers who had learned the trade, and they manufactured shoes at the rate of about one pair a day per man. This work was often done in little shops, usually located in back yards, where from three to eight men worked together. Factory buildings such as we have to-day were practically unknown at that time.

Some of the work was often given out to women, who sewed together the different parts of the uppers of the shoes by hand in their homes. Lucy Larcom has given us a vivid picture of one of these workers in Hannah Binding Shoes, from which the following verse is taken:

Poor lone Hannah,
Sitting at the window, binding shoes!
Faded, wrinkled,
Sitting, stitching in a mournful muse!
Bright-eyed beauty once was she,
When the bloom was on the tree.
Spring and Winter
Hannah's at the window, binding shoes.

John Greenleaf Whittier, the Quaker poet of New England, was a shoemaker in his youth. He praised the gentle craft in a Ballad to Shoemakers and also wrote Cobbler Keezar's Vision.

SOME SHOE MACHINERY IS INVENTED

Previous to 1845 there had been little change in the tools used; the lapstone, the hammer, the crude knife and the awl being the most important. But in that year a rolling machine was perfected. It took the place of the lapstone and hammer, which the shoemakers had used to make the leather tougher. By the use of this machine a man could obtain in half an hour the same results as a workman could in a whole day by the old method of pounding.

The first McKay Sewing Machine was established in Lynn in 1861. At that time there was a great demand for boots

for soldiers engaged in the Civil War. As the war also took many men from the shoemaking trade, more and more machinery was used. This increased demand for shoes and the scarcity of labor led to many improvements in shoemaking machinery, the most important of which was the Goodyear Welt Sewing Machine, for which patents were obtained in 1871 and 1875. These patents were the beginning of the now-famous Goodyear welt system of manufacturing shoes, but not until nearly twenty years later did the machine become really successful. Since that time one improvement has followed another.

Many factories were built, chiefly at Brockton, Boston, Beverly, Haverhill and Lynn, and were equipped with all the modern machinery. Though many shoes are made in other states, particularly in Wisconsin, Missouri, Illinois and Ohio, the production of Massachusetts is still by far the largest. Making shoes by machinery began later in Canada than in the United States, but now there are many well-equipped factories, which supply the largest part of the needs of the people. These factories are chiefly in the provinces of Ontario and Quebec.

THE UPPER, THE SOLES, THE HEELS AND THE LAST

Now let us see how a pair of Goodyear welt shoes is made in a modern factory. When an order is received at the factory, very careful specifications are made, telling the size and style and the quality of the material to be used. Similar descriptions, or specifications, of each part are sent to the foreman who has charge of the making of that part. From careful measurements of these parts the patterns of the soles and parts of the uppers and linings are cut out, and the lasts are also made. The last, which is made of wood, is the size and shape of the foot for which the shoe is made. In a great factory many shoes are made from the same pattern and on the one last.

The parts of the upper are cut out of leather which is tough but soft and pliable. The machine which does this work cuts more quickly and accurately than any human hand. The edges of these parts are "skived," or thinned down to a beveled edge, then given a coating of cement, and afterward folded on a machine which turns back the edge and pounds it down flat so that it presents a smooth and finished appearance. The toe-caps are stamped out and perforated by a machine. On one of the top linings is stamped the order number and size of the shoe. Then the parts of the upper are sewed together with the linings and stays. A machine rapidly puts in the eyelets, placing them on both sides at once, directly opposite each other. This finishes the upper.

THE SOLES AND HEELS ON WHICH WE STAND

The outsole, or outer sole, is cut from sole-leather, which is thicker and stronger than that used for the upper. It is then passed to a heavy rolling machine, where it is subjected to tons of pressure between heavy rolls. This pressure, which takes the place of the hammering which the old-time shoemaker gave his leather, brings the fibres more closely together and greatly increases the wearing qualities. The outsole is then passed through a machine which reduces it to a uniform thickness.

The insole, which is made of much lighter leather, is prepared in a similar manner and is also reduced to a uniform thickness. A machine cuts a slit which extends half an inch into the edge of the insole, separating the edge into two parts. One of the edges is called the lip. The same machine cuts a small channel, or groove, along the surface inside the lip. The lip is now turned up by another machine so that it stands at right angles to the insole. To this lip the welt and upper are sewed later on, and the groove made by the channeling machine inside the lip then serves as a guide for the operator of the sewing machine.

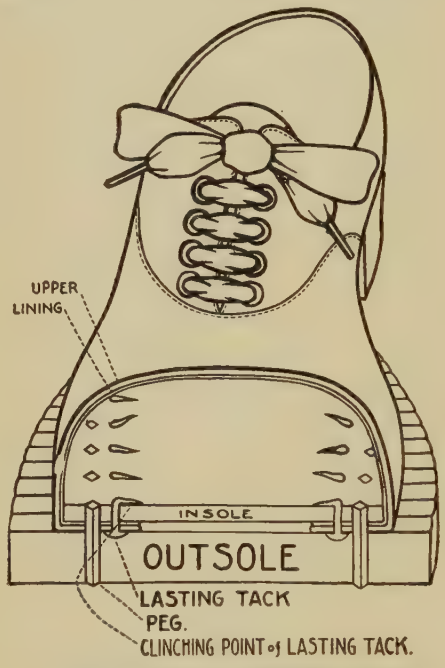
The heel is made of different lifts, or layers, of leather cemented together. It is then placed under great pressure, which gives it form and makes it stronger. The counter, which stiffens the back part of the shoe, and the toe-box, or stiffening which is placed between the toe-cap and vamp, are made in the same room. When these are all completed they are sent to the making, or bottoming, room, where the other parts have been brought.

PUTTING THE DIFFERENT PARTS OF THE SHOE TOGETHER

There a machine passes strong twine through the eyelets and ties it automatically. This keeps all the parts of the upper in their proper position while the shoe is being made. Another machine tacks the insole to the bottom of the last.

A workman then places the toe-box and counter in their proper places and draws the upper over the last.

A wonderful machine pulls the upper smoothly down to the last. The pincers of this machine grasp the leather at different points on each side of the toe. The operator, standing where he can see when the upper is placed exactly where it belongs, presses a foot-lever and the pincers close, drawing the leather securely against the wood of the last. By moving



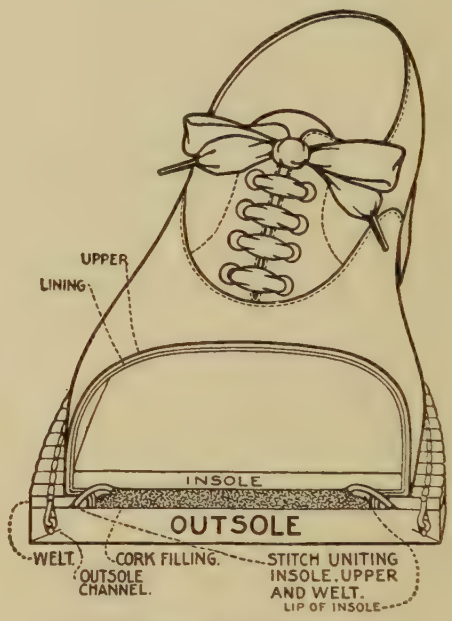
CROSS SECTION OF A PEGGED SHOE

In this type of shoe wooden pegs are driven through the outsole, the upper and the insole. The tacks used in lasting are driven way in and clinched against the steel bottom of the last to help hold the upper and insole together. The ends of the pegs and tacks, which show on the inside, leave the surface rough, until the pegs are cut off.

different levers the workman adjusts the shoe accurately, so that each part of it lies in the exact position intended for it when the shoe was designed. The operator again presses the foot-lever: the pincers move toward each other and draw the leather securely around the last. At the same time three tacks are driven automatically on each side and one at the toe, which hold the upper securely in position. These tacks are driven in only part way, so that they may afterward be removed.

The shoe is now ready for lasting. This is one of the most difficult and most important parts of the process, for upon the success of this operation largely depends the beauty and comfort of the shoe. Machines draw the leather tightly around the last so that not a wrinkle is left anywhere, and also pull it down over the insole, where tacks hold it in place. These tacks are also driven in only part way.

The surplus leather around the insole is cut away and the edges made smooth.



CROSS SECTION OF A WELT SHOE

In this type of shoe the tacks used in lasting are all withdrawn and a machine with a curved needle sews the welt and shoe upper to the insole without going inside the shoe. The outsole is then stitched to the welt. By this method the inside is left perfectly smooth for the foot. Such a shoe does not wear out stockings as a peg shoe does.

The leather and the counter around the heel are then pounded until the stiff portion conforms exactly to the shape of the last. A machine fastens the upper and lining to the lip of the insole by means of little staples of fine wire, and the tacks which had been driven in temporarily are withdrawn.

SEWING THE WELT SECURELY TO THE INSOLE

The shoe is now ready to receive the welt, which is a narrow strip of leather that is sewed all along the edge of the shoe except where the heel is placed.

This welt is sewed from inside the lip of the insole, so that the curved needle passes through the lip, upper and welt, uniting all three securely and allowing the welt to protrude evenly along the edge. In making the stitch the needle does not go inside the shoe, but passes through only a portion of the insole, leaving the inside perfectly smooth. This part of the work was formerly one of the most difficult tasks in shoemaking. As it was done by hand, different operators sometimes made stitches of different lengths and different tensions. Such stitching did not always wear well, because it did not hold the different parts of the shoe firmly together.

The invention of the Goodyear Welt Sewing Machine changed all this. Auguste Destouy had invented a curved-needle machine for sewing outsoles to welts, but it was not successful until taken in hand by Charles Goodyear, son of the well-known inventor of India-rubber fabrics. This device was first used in a machine for sewing "turn" shoes, but later was adapted by Goodyear in the famous sewing machine which bears his name. This machine has revolutionized the manufacture of shoes. It makes stitches of equal length and measures them automatically; it draws the strong linen waxed thread evenly and forms a stitch which holds the welt, upper and insole securely together. After sewing, the surplus portions of the lip, upper and welt are trimmed off, and the welt is beaten so that it stands out evenly from the side of the shoe.

How the outsole is treated before it is fastened

The insole and welt now receive a coating of rubber cement. The rubber makes the sole waterproof. A workman tacks the shank on the insole between the heel and forepart of the sole and fills the bottom with ground cork and rubber cement. The outside sole receives a coating of this cement on the flesh side, that is, the side next the animal. It is then pressed firmly on the bottom of the shoe, where it is held in place by the cement.

The whole shoe is now forced down into a rubber pad, or mold, which has been shaped to the exact curve of the bottom of the shoe. By this process every part of the sole is pressed firmly against the bottom of the shoe and welt, and shaped to the desired curve. The outsole and welt are trimmed so that they protrude a uniform distance from the edge of the shoe.

The outsole is then sewed to the welt by a machine which makes a lockstitch, which shows on the upper side of the welt after the shoe is finished. An automatic leveling machine rolls out any unevenness in the sole.

Placing and trimming the heel one of the last things

The heel is now put on. The rough lifts are trimmed to the desired shape, and the breast of the heel is cut to the correct angle and curve. Then the edge of the insole is trimmed smoothly. The edges of the shoe and welt now receive a coating of special blacking, and every stitch on the upper side of the welt is made to show clearly. The heel is coated with a special ink and brushed until its surface is bright. The bottom is blacked or stained and also brushed until it has a high gloss. The trade-mark or trade-name of the manufacturer is then stamped on the bottom, or shank.

The finished shoe is now taken off the last and put on a shoe-tree. Every wrinkle is rubbed out, and three little creases are made across the vamp where it naturally creases when the shoe is bent. After a final brushing, the finished shoe is packed in a pasteboard box, ready for the wearer.

Leathers of several kinds used for shoes

There are, as you have learned, many kinds of leather made from the skins of different animals. Most fine shoes are made from the skin of the calf or the kid. Heels and soles are made from the skin of the ox or cow, and some heavy uppers also. Much goatskin is also used, and some shoes are made from the skin of the horse. Sheepskin is used to imitate kid, and some deerskin is used, but the supply is too small to be of much value.

Other leathers are occasionally used. A few shoes are made from monkey skins, and the skins of alligators and lizards are sometimes used. Very rarely shoes are made from snakeskins. Many shoes are also made wholly or partly from cloth, except the sole, of course. This is generally made from leather, except for house shoes, though there are now some substitutes for leather soles which are much worn, and uppers are sometimes made from these leather substitutes.

THE SIZES AND THE NUMBERS OF YOUR SHOES

Shoes are made in twenty-six different lengths, numbered in two series, from 1 to 13. One-third of an inch is a size; that is, the difference in length between a number 8 and a number 9 shoe is one-third of an inch. Between most of the sizes, half-sizes are made. Usually there are five different widths for each size, A, B, C, D and E, and in fine shoes there are also half-sizes. One-twelfth of an inch is a width, as, for example, the difference between a B and C width is one-twelfth of an inch.

Some people are foolish about the size of their feet, and do not like to seem to wear a large shoe. For this reason some manufacturers do not use the regular numbers, but use a special set so that the buyer cannot tell what is the regular number of the shoe he or she is buying. The merchant can often persuade the buyer to get the right size rather than one too small.

While shoes protect our feet, they may also injure them unless we are careful to get shoes that really fit. One pair of shoes of the wrong shape, or too short, or too narrow, may injure our feet to such an extent that they will never be normal again. Many people suffer pain and inconvenience all their lives because of one ill-fitting pair of shoes.

SHOES OF OTHER PEOPLES AND OF OTHER TIMES—THE SANDAL

From the earliest times men wore some form of foot-covering to protect their feet from the rough way or hot sands over which they had to travel in search of food and clothing. If the way was not too rough, they went about barefoot, as the bottom of the foot will grow hard and horny if not protected. The first foot-covering used was probably a simple form of sandal—a rough piece of hide, wood or plaited grass, held to the foot by narrow strips of hide brought up between the toes and tied about the ankle. Rough wooden shoes are still used in some parts of Europe.

Later the sandal was developed and ornamented by the Greeks and Romans. Although this was their usual form of footwear, high boots were used for hunting and traveling. In Rome at one time a man's rank was shown by the color of his shoes.

Sandals are still worn wherever people remain in a primitive or semi-primitive state. They are worn also by a few orders of friars and by some peasants in Spain, Siberia and the Balkans. The Japanese wear a sandal with a felt sole, and remove it when they enter the house. Although the leather shoe is recognized by the Government as the official one, the people still cling to the sandal. The upper part, or covering, is made of many different fabrics.

In cold climates, where more protection was necessary, more straps, or thongs, were used, but more often a bag-like covering was worn, like the Indian moccasin. The Eskimo wears a high boot which is very loose at the top. It is made of the skins of animals and is often lined with feathers.

HIGH SHOES OR BOOTS IN THE PAST

From the sandal a foot-covering was devised which covered not only the foot, but also the lower part of the leg. Often the leg was made of soft colored leather. One form of heavy boot, which reached above the knee, was called the "Jack-boot," still worn occasionally by cavalrymen. Rubber boots of the same shape are now sometimes worn by fishermen and firemen.

After the fourteenth century shoes began to change their shape. Very long, pointed toes became the fashion. The toes were so long that they were tied to the leg about the knees. The style ran to such extremes that laws had to be passed to stop it. In Queen Elizabeth's time very high heels were the fashion. One pair of her slippers which has been preserved had heels nearly four inches high, and very thick soles. Afterward the style called for broad, square toes and low heels. During all this time shoes were much ornamented. Often they had rosettes of silk or gold lace, and were sometimes trimmed with rows of gold braid. Then high heels came in again, and no one would wear shoes with low heels.

So you see there has never been a standard shoe which was worn at all times. Styles have changed many times, and we may go back some day to the ornamented shoes of four or five hundred years ago. We see house shoes that are much ornamented, and some street shoes are made of colored leathers even now.

THE NEXT STORY OF FAMILIAR THINGS IS ON PAGE 6593.

THE STORY OF A PAIR OF SHOES

When a pair of shoes is about to be made in a factory, metal patterns for the uppers are cut by a machine similar to this.

A workman called a clicker cuts the uppers from the skin.

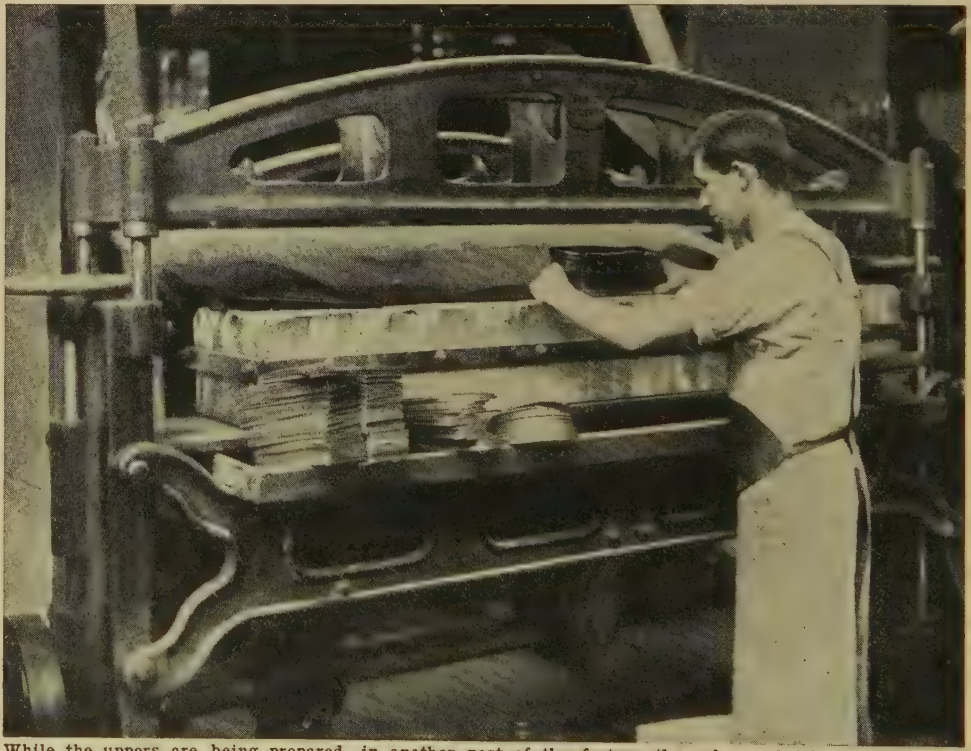
Many shoes have a toe-cap, and the design on this is punched out at one operation.

The various parts of the uppers are then pasted together by a woman known as a paste-fitter.

CUTTING OUT THE SOLES AND THE HEELS

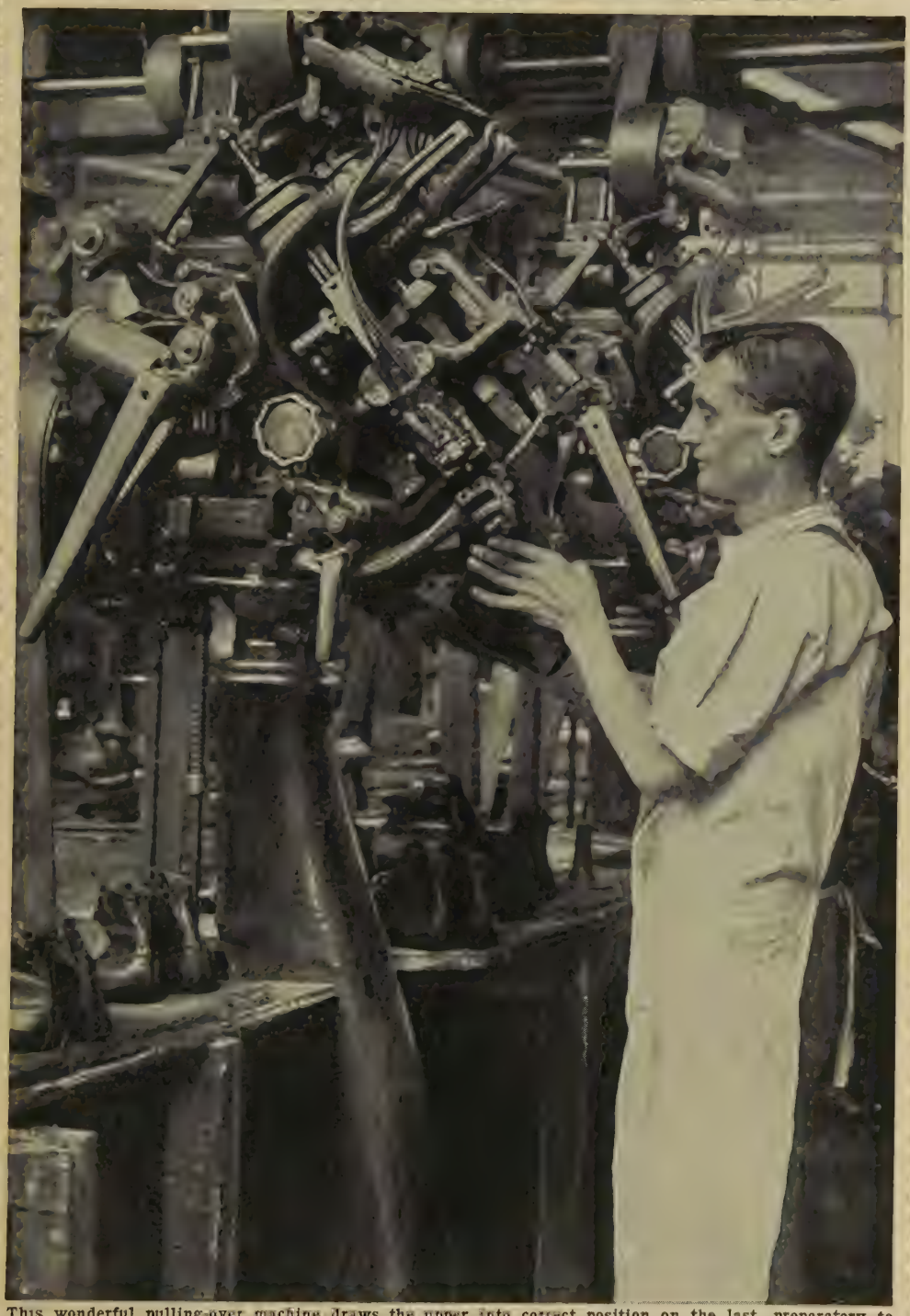
Next they are sewed securely together by means of a variety of sewing machines.

In lace shoes the lace-holes have to be fitted with metal eyelets by means of an eyeleting machine.



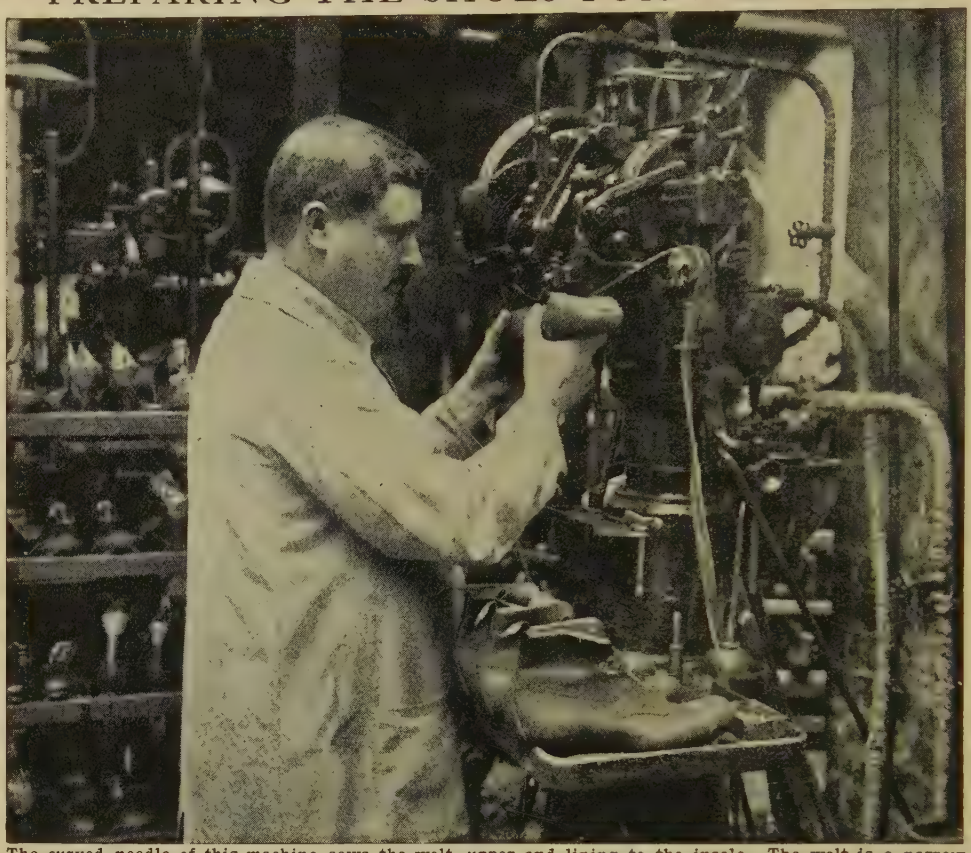
While the uppers are being prepared, in another part of the factory the soles and lifts, or pieces of leather for the heels, are cut out in a press by shaped knives, as shown here.

MOLDING THE UPPERS TO THE LAST

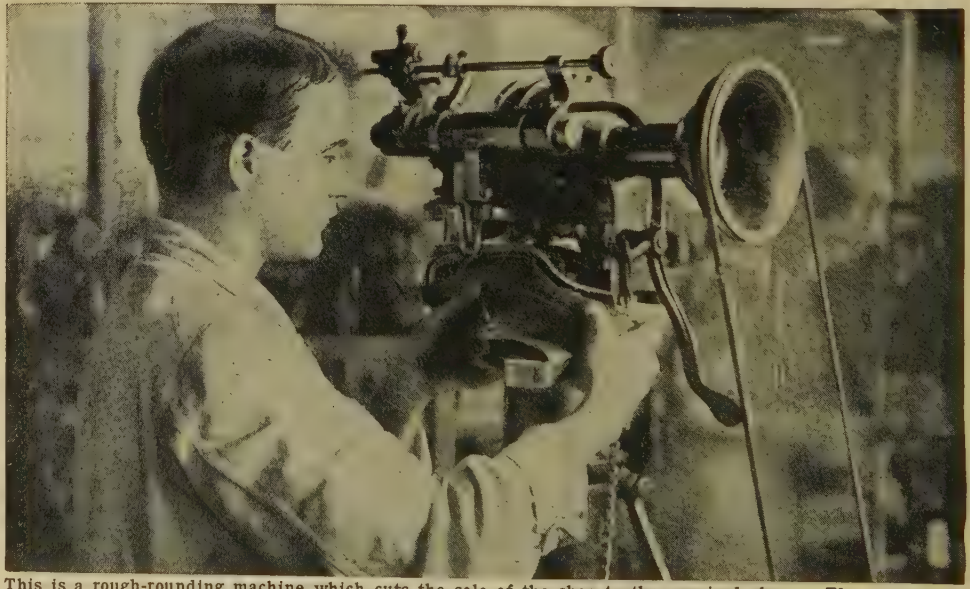


This wonderful pulling-over machine draws the upper into correct position on the last, preparatory to the important operation of lasting. Pincers grasp the sides and the toe, and draw the upper tightly down to the last. The operator quickly brings each seam into the proper position, and the machine drives tacks to hold them there.

PREPARING THE SHOES FOR THE SOLES



The curved needle of this machine sews the welt, upper and lining to the insole. The welt is a narrow strip of leather and is the essential feature of a shoe of this kind.

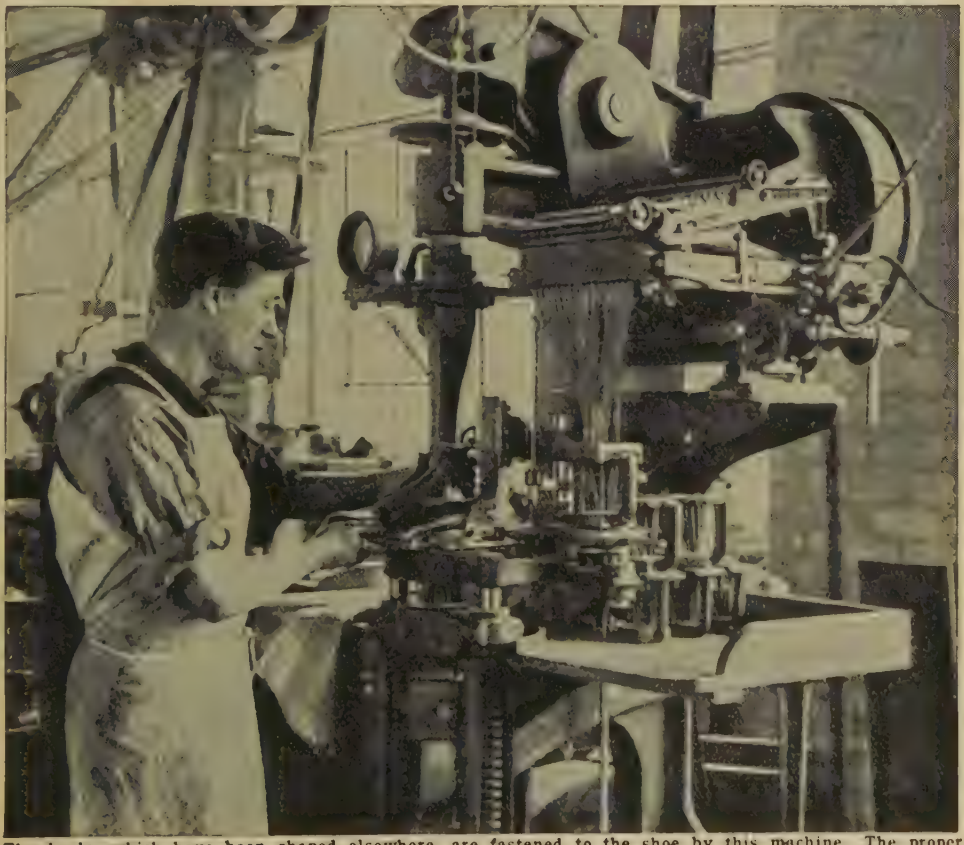


This is a rough-rounding machine which cuts the sole of the shoe to the required shape. The appearance of the finished shoe depends greatly upon this operation.

PUTTING ON THE SOLE AND HEEL

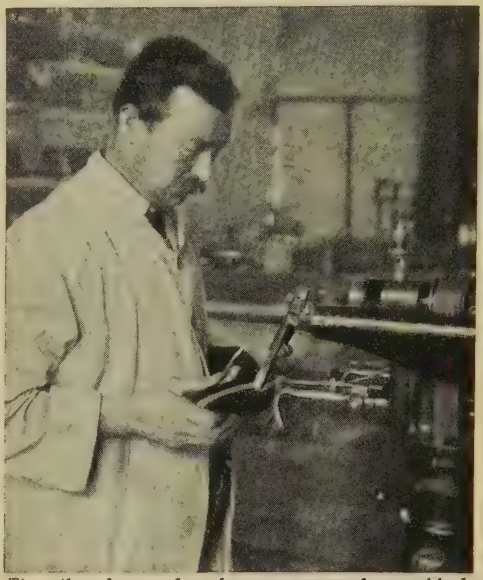
The outer sole is next sewed securely to the welt with waxed thread by means of this machine.

The shoes pass to another workman, who levels the soles so that they are ready to receive the heels.



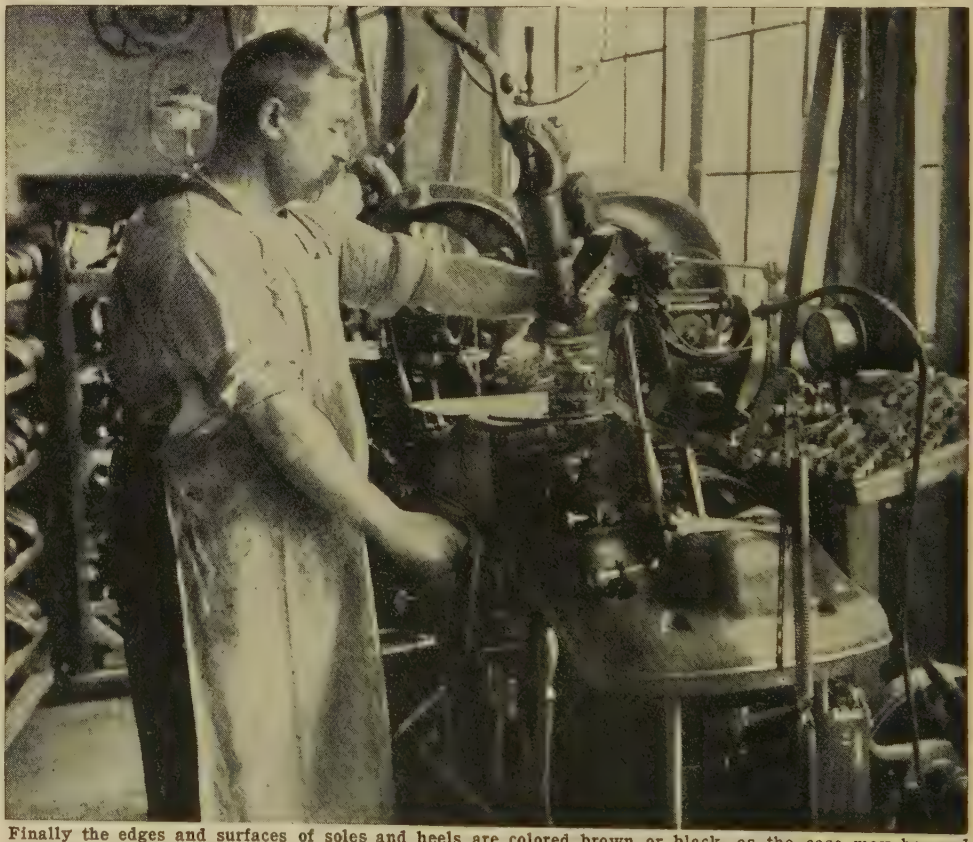
The heels, which have been shaped elsewhere, are fastened to the shoe by this machine. The proper number of nails is driven in at one time, and the top lift covers the heads of the nails.

FINISHING THE SHOES FOR THE SHOP



Then the edges and surfaces are scoured, or rubbed smooth, with sandpaper on a revolving wheel.

The edges are then burnished to a perfectly smooth finish by the hot iron of this machine.



Finally the edges and surfaces of soles and heels are colored brown or black, as the case may be, and are polished on this machine. The shoes are then ready to be cleaned, boxed and sent to the shop.

MAKING A PAIR OF SHOES BY HAND

All shoes were once made by hand, and expensive shoes made to measure are still made in this way. The workman is molding the upper on a last.

He then sews on the welt by hand, making the necessary holes for the thread by means of an awl. In all the operations he uses his knees as a bench.

The workman next sews on the soles, as shown above, using waxed thread for the purpose.

Finally he nails on the heel lift by lift, trims and polishes sole and heel, and the shoe is ready.

Many of our shoe pictures were taken in the works of the True Form Boot Company.

A SHOE WHICH MUST BE UNCOMFORTABLE

© Underwood & Underwood, New York.

This picture shows a peculiar kind of shoe sometimes worn by the lower classes in India. They are probably the oddest shoes in the world, as they are only a flat block of wood with a large knob which slips between the first and second toes. It would seem that they must be exceedingly clumsy and uncomfortable. One certainly could not move very rapidly in them, but they keep the feet off the ground, and are easily dropped when the wearer enters a house.

SOME QUEER SHOES WORN IN CHINA

© Underwood & Underwood, New York.

In this picture you see the tiny shoes of fine kid and silk embroidery worn by Chinese ladies of the upper classes in Canton. Notice the peculiar shape, the pointed toes and the high heels. The horrible custom of foot-binding has only just died out, and many Chinese women with deformed feet are still living. They can only totter along with great difficulty and discomfort. This bad custom was confined to the higher classes. The women of the common people who had to work had normal feet.

THE COUNTRIES AND CAPITALS OF THE CONTINENT OF EUROPE

IN THIS MAP WE SEE THE MANY COUNTRIES OF EUROPE WITH THEIR CAPITALS AND CITIES OF OVER HALF A MILLION INHABITANTS

6456

The headquarters of the League of Nations at Geneva.

THE NEW MAP OF EUROPE

CONTINUED FROM 6348

WITHIN the last hundred odd years the map of Europe has undergone many small and three great transformations. The first great change came after the Napoleonic Wars, when in the Congress of Vienna diplomats tried to straighten out the tangles made by the conqueror. In 1879 the Balkan states made a great effort to get rid of the overlordship of Turkey. After a brief war, settlement was arrived at. By the Congress of Berlin Turkey was much reduced, but still the Balkan peoples were left dissatisfied. The World War of 1914–18 gave the statesmen who met at Versailles very many difficult problems to solve.

During the course of the war four great empires, namely, Russia, Austria-Hungary, Germany and Turkey broke up. Their pieces had to be replaced somehow. Furthermore, several countries in previous wars had lost territories which contained large numbers of their race, and they were impatient for their return.

When you have problems in arithmetic or algebra to solve, you generally use a rule, or formula, and apply it according to the special conditions of the problem. What rule, or formula, could the diplomats at Versailles use that would help to solve their many problems? They were anxious to make a just and lasting settlement, and one that would contain no seeds of future wars. The claimants for justice at the board were many, and their demands were not all reasonable. Yet, if some sort of common rule were applied to all, none could complain of unfairness. So as far as could be, in re-sorting the pieces of the jig-saw puzzle that war had made of Europe, they worked on the principle of "self-determination on a basis of race," which means that, wherever possible, the people of one race were grouped together and left to decide for themselves how they would be governed.

Look at your map of Europe before the war, and you will see that you can divide the countries into different classes. First there will be that class —it is a small one—of those countries which were not directly concerned in the war, and whose boundaries therefore will remain much as formerly. To this class belong Spain, Holland, Switzerland, Norway and Sweden. You know the term for these countries: it is "neutral," from the Latin *neuter* meaning "neither"—they fought on neither side. Denmark was neutral, but underwent a slight alteration on the new map.

The next class will consist of those countries that lost the war, namely, Germany, Austria-Hungary, Bulgaria and Turkey. On a new map of Europe you will expect to find these somewhat smaller in size, and you will be surprised to find how much smaller the second of these, Austria-Hungary, has become.

We shall not call our third class the countries that won the war, for if we looked at them straightway and expected to find them include all the territories that the losers lost, we should be disappointed. From the fragments of Austria-Hungary and from the break-up of Russia new states which clamored for independence have been set up. These are: Czecho-Slovakia, Jugo-Slavia, Poland, Esthonia, Latvia and Finland.

Our fourth class includes the countries of the victors: France, Belgium, Italy, Rumania, Portugal and Greece. Russia will appear shorn of some of her territory, but Russia must go in a class by herself, for her alterations are of two kinds, those made by the peace treaty and those made by herself.

THE COUNTRIES OF THE VICTORS IN THE WAR

Let us examine this last class first. France in an atlas dated 1920 would have the same boundaries as she had in 1870, fifty years before. By the peace treaty she regained the two provinces of Alsace and Lorraine, which in the Franco-Prussian War of 1870 Germany took away from her. She gained, besides, the coal-mines of the Saar Valley, but as these territorially cover only a small district, they would hardly show upon our map. Alsace and Lorraine were German for forty-four years; the inhabitants had to send their children to German schools, they had to obey German laws, train to fight in German armies, put their money in German trading concerns. Forty-four years is almost a generation, that is the average length of a man's life, and the readjustment to French conditions will be slow and call for patience and understanding.

We turn next to Italy. Upon the map Italy looks as if it were meant to be a united country, with its confining sea to east and west and encircling mountains to the north, but it was not a kingdom until after 1861, when its duchies, republics, cities and kingdoms were united under King Vittorio Emmanuel. Previous to this Italy had been regarded as a "geographical expression" only, and it had not been thought wrong to take away some of its parts, as had happened in the Congress of Vienna when to Austria were given the Trentino and Istria and Dalmatia. A large proportion of the inhabitants of these provinces were Italians, however, and Italy made several attempts to regain her lost lands, and there even grew up a party whose sole aim was to recover this "unredeemed Italy," or *Italia irredenta*. Geographically as well as racially the Trentino, Istria and Gorizia seem to belong to the peninsula, and at the peace table in 1919 were so allotted. The line in the Trentino was so drawn as to include a quarter of a million Germans. It is possible that Austria will feel a claim to part of this region. In addition, Italy received from Austria-Hungary some of the islands off the Dalmatian coast and Zara on the mainland, the island of Saseno from Albania, Kastelorizo Island from Turkey, and was allowed to occupy the island of Rhodes for fifteen years, at the end of which time a plebiscite, or general vote, will be taken to decide which power the Rhodesians prefer to have govern them. The port of Fiume in Istria, which had a mixed population, was made into an independent state, until in March, 1924, it was formally taken over by Italy, with the consent of Jugo-Slavia.

RUMANIA AND GREECE ALTER THEIR FRONTIERS

Rumania, on the new map of Europe, has doubled her size and presents a very much more compact appearance than she did on the old. By the treaty she gained: the region of Transylvania from Hungary, for this mountainous region is largely inhabited by Rumanians who felt much oppressed under Magyar rule; Bessarabia from Russia, and Bukovina and Banat from the Austro-Hungarian Empire. Formerly Rumania and her neighbor Bulgaria were about equal in size and strength.

Greece has been busy altering her boundaries even since the peace treaty. By it she received in Asia Minor the city of Smyrna and its vicinity, to administer for five years, after which time a plebiscite was to be taken. She received, besides, a large portion of Thrace to the east of the Maritza River from Turkey, and the large scattered group of islands

known as the Dodecanese. In attempting to extend her gains in Asia Minor she was not only driven out of Asia Minor, but lost also a good part of the territory of eastern Thrace won from Turkey in previous wars. The conference held at Lausanne in the summer of 1923 redefined her boundaries, leaving her with the part of Thrace she gained from Bulgaria, but only a small portion of eastern Thrace which she had previously had from Turkey. Turkey gave the Dodecanese to Italy.

Belgium's frontier has undergone very little apparent alteration. She received on her eastern boundary the districts of Eupen and Malmédy, with full sovereignty over Moresnet. The Portuguese boundaries were left as before.

Look at Denmark for a moment before we leave the countries that increased their territory after the war. In 1920 there were added to Denmark those parts of Schleswig which voted for Denmark at the plebiscite held in accordance with the Versailles treaty, and these were incorporated and officially named the South Jutland Provinces. As long ago as 1864 Prussia made war on Denmark and took the whole province of Schleswig-Holstein away from her. Time and nearness made Holstein and southern Schleswig more German than Danish, and they accordingly voted to remain with Germany.

The New State of Jugo-Slavia

Of the countries defeated in the war Austria and Hungary suffered the greatest reductions because included within their rule were several subject peoples whose national feelings had grown so strong as to demand independence. Austria and Hungary formed a dual alliance in 1863, and the Magyars of Hungary and the Teutons of Austria had equal rights within the empire. Yet there was a third race—the Slavs, who were equally numerous in the empire. Though as many numerically, politically they were quite powerless. To tell the truth, Austria was afraid that the Slavs of Russia and those of her own empire might sometime make common cause. She therefore oppressed the latter as much as she dared, and at last, in 1914, aimed a death-blow at Serbia, which she knew to be the strongest Slav state. But Austria and Germany did not win the war, and though Serbia was temporarily crushed, she returned to the attack. All the southern Slavs rallied round her, and at the council table Serbia formed the centre round which a new southern Slavic state was built. Its formal title is the "Kingdom of the Serbs, Croats and Slovenes," and it includes the former kingdoms of Serbia and Montenegro; with Bosnia and Herzegovina, parts of Carniola, Styria, Carinthia and Istria, Dalmatia, except Zara, and the island of Lagosta, all from Austria; Croatia, Slavonia and part of Banat taken from Hungary, and some territory on the eastern boundary from Bulgaria. These seemingly ill-assorted fragments in reality comprise (as runs the Declaration of Corfu, July 20, 1917, issued by the Jugo-Slav committee, and the rallying-cry of the Jugo-Slavs) "all the territory where our nation lives in compact masses and without discontinuity, and where it could not be mutilated without injuring the vital interests of the community." The new country has a king, chosen from the old Serbian dynasty, the Karageorgevichs, and a democratic government controlled by parliament. Its capital is Belgrade.

Czecho-Slovakia Carved from Austria and Hungary

Similarly with the Czechs and Slovaks of old Moravia, Bohemia and Slovakia. Many centuries ago these Western Slavic people were originally one, but they were conquered by Austria and Hungary at different periods, and certain differences developed in the course of time. Both resented the loss of their independence and their oppression by Teutons and Magyars, and when opportunity presented itself in the World War, they formed a most heroic brigade and fought for the Allies in Russia and Siberia and on the various fronts. Meanwhile, their intellectual leaders in Paris were working for independence, and at Versailles were prepared with a programme. The Czecho-Slovakian Republic includes Bohemia, Moravia, part of Silesia taken from Austria, part of Upper Silesia taken from Germany, part of Austria near Wolfshof; Slovakia and Carpathian Ruthenia cut off from Hungary, and Teschen, Orawa and Spisz divided between Poland and Czecho-Slovakia. It has an area of about 56,000 square miles and a population of about 14,000,000; that is to say, it is larger than either Hungary or Austria, of which it once formed part.

Austria has been reduced, said one writer, to a capital and a countrified suburb. This is hardly an exaggeration. From an area approximating 116,000 square miles it is now reduced to 31,000 square miles; and from a population of 28,000,000 to only 6,000,000. At Austria's expense, besides the creation of the new states of Jugo-Slavia, Czecho-Slovakia and Poland, Italy has straightened out her Alpine frontier and strengthened her control of the Adriatic. No longer may the proud Austrian navy make a bid for Mediterranean supremacy, no shore line gives it harbor, no port will offer berth. For a while after the struggle Austria despaired and seemed unable to pull herself together. She needed raw materials and she needed coal, but they could come only from the surrounding states which she had estranged by her former oppressive rule. She needed foreign credit to buy with, and every country had financial troubles of its own. One resort alone remained: Austria appealed to the League of Nations, and it appointed a special financial committee to examine into her situation, and, finding sufficient guaranties, floated a large loan upon the European markets. Slowly now Austria is rising to her feet. Gradually the overwhelming army of civil-service employees has been reduced; little by little the frontier barriers are lifting and racial hatred is giving way to trade and intercourse. Though the mighty are sadly fallen, a day may yet dawn for Austria when its budget balances and its people are reasonably prosperous again.

THE REDUCED KINGDOM OF HUNGARY

Hungary is in even worse case, for many of the proud Magyars are still against accepting the peace terms. Early in November, 1918, Hungary separated from Austria and set up an independent republic, which, after a brief spell of Bolshevism, has since given way to a monarchy under a regent, Admiral Horthy—though ex-Emperor Charles is dead and there is at present no king. Shorn of great portions of her territory, which have gone to Rumania, Czecho-Slovakia and Jugo-Slavia, Hungary is reduced from a prewar area of about 125,000 square miles to 36,000 square miles, and her population has fallen from 21,000,000 to 8,000,000. She has a prewar debt, a war debt and a large indemnity bill. The League of Nations helped her also to a large loan.

Poland belongs to the same class as Czecho-Slovakia, Jugo-Slavia and Finland, sometimes called "resurrected nations," which, after centuries of subjection, have risen again to new national life, or "succession states," because they have succeeded to some of the powers and estates of their old imperial rulers.

Poland is a land of whom some writer well said: "Happy is the country that has no history." She has had a long and sad history, during which her fields have been the battlefields of Europe, her cities part of some proud conqueror's booty. Up to the eighteenth century the country was independent, but about this time it went to pieces through internal weakness and outside pressure. So weak was Poland that in 1772 began the first of three partitions by which the great powers, Prussia, Austria and Russia shared her dominions among them. After 1795 nothing remained of the former proud kingdom. In 1807 Napoleon formed the grand duchy of Warsaw out of part of old Poland, and roused fresh hopes of independence among the Poles. But after Napoleon's fall Poland was redistributed, and to Russia fell the greatest share. All through the nineteenth century Russian Poland and Prussian Poland were both vigorously Russianized and Prussianized. Only Austrian Poland, at the beginning of the war, had any pretensions to self-government, in the diet at Lemberg which was subject to Vienna.

POLAND RECONSTRUCTS HER BOUNDARIES

During the war Poland became again a battlefield and campaigning ground, her three parts divided in opposing sides. In 1916 Austria and Germany proclaimed the independence of Poland, but the Russian Revolution of 1917 declared that Poland had the right to be free and form her own government, and so Poland became anti-Teutonic. Meanwhile, in Paris a Polish National Committee was working for independence, and in 1918, with the downfall of the Teutons, Poland tried to pull her divided parts together. Her claims at the peace table were extravagant, and her unwisdom left her with several boundary disputes on her hands.

Poland presents a quite imposing appearance on our maps to-day. She con-

sists of Congress Poland (the old Poland which the Congress of Vienna gave to Russia); Poznania (which is part of West Prussia), East Prussia and part of Silesia, which were ceded by Germany; Galicia, ceded by Austria-Hungary; part of Russia, ceded by the Soviet Government after a brief war in 1920; Vilna and its vicinity, about which there was a dispute between Poland and Lithuania, but which the Council of Ambassadors in March, 1923, adjudged to Poland.

Danzig has been made a free city under the guarantee of the League of Nations. It has trade relations with Poland, and both have made mutual concessions so that it is possible that Danzig may eventually join Poland. So constituted, Poland has a population of about 25,000,000 and an area of 150,000 square miles. In government the country has chosen to be a republic.

THE REPUBLIC OF FINLAND AND ITS BRIGHT FUTURE

Beautiful Finland—land of the fen or lake—is the last considerable succession state. Finland was conquered by Sweden and ruled by her until the eighteenth century, when the Russian armies gradually took possession of her territory. In 1808–9 Russia and Sweden had a great quarrel, and Finland accepted the invitation of Alexander I to become part of the Russian Empire as a self-governing duchy. About eighty years later Russia began to be very autocratic, and tried to take away or suppress all Finnish rights and privileges. The Russian Revolution of 1905 restored these for a while, but repression began again, and became so severe that Western Europe protested. On the outbreak of war Finland naturally was pro-German and anti-Russian. In 1917 terrible strife developed between the Red, or Bolshevik, element and the White, or Conservative. After much cruelty on both sides the Whites were victorious. To-day Finland faces a bright future. Her timber and fish are abundant, her natural beauty offers a playground for the tourist. She has secured an outlet to warm water in the Arctic Ocean (influenced by the Gulf Stream) in the Pechenga district allotted to her by agreement with Soviet Russia. By award of the League of Nations she received the Aland Islands at the outlet of the Gulf of Bothnia from Sweden. She has an area of about 149,000 square miles and a population of about 3,500,000. Her form of government is republican.

Before we leave the Baltic Sea, find three small new states on its eastern shore, Lithuania, Latvia and Esthonia. Lithuania, a plains country with thick forests and many lakes, was united with Poland by marriage ties after 1386. In the partition of Poland some of Lithuania fell to Russia, who oppressed her, forbade her language, and exiled her leaders. Much the same happened in that part of Lithuania which fell to Germany and was included in East Prussia. German was declared the official language, and thousands of German colonists sent in to take up land. At the Conference of Versailles Lithuanian statesmen demanded independence, and as the presiding powers were trying to give fair play to all suppressed nationalities, the little state of Lithuania was once more carved out and set upon the map. In the dispute with Poland about Vilna and the neighboring region Lithuania lost, although Vilna was an old Lithuanian town.

THE NEW BALTIC STATES OF ESTHONIA AND LATVIA

At the beginning of the war Esthonia, Livonia and Courland, known as the Baltic provinces, were parts of the Russian Empire. The people of the region have now formed two states: (1) Esthonia, which is formed of the old province of Esthonia and more than half of Livonia, and (2) Latvia, formed out of the rest of Livonia and the whole of Courland. Unlike Poland or Lithuania, these states have never before been independent. Esthonia and Latvia are both republics. The former has an area of 23,000 square miles and a population of 1,750,000; the latter 25,000 square miles and 1,503,000 people.

The differences in the after-war European boundaries of Germany are not so very striking. Outside of Europe, however, Germany lost all her colonies—which included large African territories and a considerable island-empire in the Pacific. Her most considerable concessions were: to France, Alsace and Lorraine and the Saar coal-mines; to Poland, parts of East and West Prussia, Posen and Silesia; to Czecho-Slovakia, part of Upper Silesia. She gave, besides, small districts to Belgium, relinquished her control over Luxemburg and part of Schleswig. Danzig and Memel were internationalized. Her frontier is now badly cut into by Czecho-

Slovakia (whose German memories are not particularly happy), where formerly it lay alongside friendly Austria. Instead of Russia, on the northeast lies Poland—known hitherto as subject, now to be tried out as neighbor.

BULGARIA A VICTIM OF HER OWN GREED

Bulgaria, a one-time dependency of Turkey, threw off the yoke in 1908, and made herself independent of the sultan. Encouraged by her example, the other Balkan states joined and formed the Balkan League, whose object was to drive Turkey out of Europe. Accordingly, in 1912 they fell upon a Turkey weakened by her recent war with Italy. After a short war, in which they drove the Turk into a small corner of his former great empire, they were completely victorious. Then, to the dismay of Europe, which had witnessed and applauded their heroic fighting, the states fell to fighting among themselves, and before another year had passed, Turkey had joined Serbia, Greece and Rumania, and was fighting against Bulgaria. After a two months' war Bulgaria was obliged to make peace and agree to diminished boundaries. But she bided her time, and in 1915, after negotiating with both sides, sold herself to the highest bidders, Germany and Austria. Thereafter she made herself useful to them in military operations near the Serbian and Greek frontiers, and became a thoroughfare for reinforcements for the Turks. By the terms of the peace treaty Bulgaria gave up to Greece the whole of the Ægean coast; she also lost four areas on her western frontier to Serbia, the Tsaribrod, Bosilegrad, Strumitsa and Timok districts, which were cut off on the ground that their possession by Bulgaria would threaten the railway from Nish to Saloniki in time of war. To Rumania she ceded the Dobrudja district.

Bulgaria has had almost eight years of war within the last two decades, with consequent severe loss in manhood and resources. She has great debts and fewer resources to meet them with; nevertheless, there is a certain grim determination about the Bulgar which is worth a great deal, and will do much toward helping the country out of its depression.

THE TURK STILL REMAINS IN EUROPE

The Turk remains in Europe. Emerging from the central Asiatic plateaus in the ninth century, he spread himself over Mesopotamia, Syria, Palestine, Egypt, and finally battered his way into Europe itself. Constantinople fell in 1453. Hungary was conquered in 1526, Vienna was besieged in 1529; but this was the high-water mark of Turkish progress westward. No crusade has been able to get him out. Spreading like a blight over the eastern-most peninsula of Europe, he held the Balkan peoples in iron grip. Greece threw off the yoke in 1829, and at intervals throughout the century the different Balkan states attained a greater measure of freedom. Jealousy among the great powers was responsible for keeping the Turk in Constantinople. No power wanted to see another in possession of the strategic gateway of the Bosporus. The Balkan League could have expelled the Turk from Europe, but disputes crept in among its members, and his days were thereby prolonged. In the World War Turkey fought on the side of Austria and Germany. In the peace treaty of 1919, besides losing her Asiatic empire in Mesopotamia, Palestine and Syria, she lost all her European possessions except the city of Constantinople: the Zone of the Straits was internationalized. In Asia Minor Smyrna and its neighborhood were placed under Greek administration, with a provision for a plebiscite to be held in five years. But Greece made an attempt to extend her possessions in Asia Minor. Instead, she was repulsed by the Turk reorganized in a Nationalist Movement under Mustapha Kemal, was driven from Smyrna, and later, in the summer of 1923, the Peace of Lausanne forced her to give eastern Thrace back to Turkey, as well as to relinquish her claims in Asia Minor.

Albania is a little mountain principality on the western shore of the Adriatic which asserted its independence of Turkey after the First Balkan War. The great powers appointed Prince William of Wied as its ruler, but left Albania to fight out her own quarrels resulting from her ill-defined boundaries. Upon the eve of the war Prince William left the country, which fell back under its local chieftains. During the struggle northern and central Albania were overrun by the Austrian armies, but in 1918 the Allies advanced from Saloniki and the country was rewon.

When it came to settling frontiers, there was trouble because a division of

Albania had already been arranged by the secret Treaty of London made in 1915 when Italy entered the war. By this treaty only the central part of Albania retained its independence, the northern part was given to Serbia and the southern to Italy, while Greece and Montenegro both clamored for certain concessions. In December, 1920, Albania was admitted into the League of Nations, and in the following year her boundaries with Jugo-Slavia and Greece were finally and satisfactorily determined.

Photo Underwood & Underwood.

The Peace Treaty was signed in the magnificent Hall of Mirrors, Versailles. In this huge room mirrors gleam from the walls on every side, and overhead a vaulted and frescoed ceiling looms dark and high. No mere accident placed the signing of the treaty here. In 1871 this same hall witnessed a very different scene: there, after a victorious campaign against France, the Prussian king was made German emperor, and there President Thiers signed the peace terms dictated by Germany. The treaty was placed on the peace table by an officer of the French Foreign Office, and then after the other delegates, officials and correspondents had been seated, the German delegates entered the hall. In response to a brief invitation from M. Clemenceau they rose and signed the treaty. The delegates of the other powers then signed in turn. At the end of the conference the allied and associated delegates remained seated for a few moments to allow the Germans to leave the building. Then the great guns boomed out, their concussion shaking the old palace of Versailles to its foundations. A new reign of peace had once more begun.

THE UNITED STATES OF RUSSIA REPLACE THE FORMER EMPIRE

What has been done to the map of Russia? It is difficult to be exact, for conditions are not as yet permanent in that great country. By the peace treaty Russia lost a great slice of her western area, sufficient to make the states of Finland, Esthonia, Latvia, Lithuania, a large proportion of Poland, and Bessarabia. She has, as it were, receded toward the East. By her own internal revolution she has changed from a despotic empire centrally controlled to a union of socialist republics, the United States of Russia. Besides the states on the Baltic which have been definitely set up as independent governments, the Soviets have recognized the practical independence of the Far Eastern Democratic Republic of Siberia, White Russia, Ukraine, Georgia, Azerbaijan and Armenia. Besides these genuine nations there are the independent communes of Karelia and the German Volga commune, and a number of self-governing areas and republics. The constitution for this union of socialist republics which was ratified in July, 1923, provided that supreme power should rest in a committee made up of two houses, the Council of Union and the Council of Nationalities. Moscow, instead of Petrograd, is the capital of Soviet Russia.

THE NEXT STORY OF ALL COUNTRIES IS ON PAGE 6583.

FRENCH—THE NEW GOVERNESS

First line, French; second line, English word; third line, as we say it in English.

Un jour maman nous fait venir et dit: "Nous allons demeurer un an à Paris."
One day Mamma us makes to come and says: "We go to dwell a year at Paris."
One day Mamma calls us and says: "We are going to live in Paris for a year."

"Pourquoi?" dit Jeannette. "Papa a des affaires ici. Es-tu contente?"
"Why?" says Jenny. "Papa has some business here. Art thou content?"
"Why?" says Jenny. "Papa has business here. Are you glad?"

"Oui. Nous n'aurons pas de leçons." "Si! Une institutrice viendra."
"Yes. We (not) shall have not any lessons." "Yes! An instructress will come."
"Yes. We shall have no lessons." "Oh, yes, you will! A governess is coming."

"Comment s'appelle-t-elle? Est-elle Anglaise?" "Mlle. Loué est Française."
"How herself calls she? Is she English?" "Miss Loué is French."
"What is her name? Is she English?" "Mademoiselle Loué is French."

"L'aimerons-nous?" "Oui; elle vous enseignera beaucoup de nouveaux jeux."
"Her shall like we?" "Yes; she you will teach many of new games."
"Shall we like her?" "Yes; she will teach you lots of new games."

A trois heures nous allons à la gare. Nous cherchons Mademoiselle.
At three hours we go to the station. We search for Miss.
At three o'clock we go to the station. We look for Mademoiselle.

Enfin maman dit: "Venez, mes enfants! Voici Mademoiselle!"
At last Mamma says: "Come, my children! Here is Miss!"
At last Mamma says: "Come, children! Here is Mademoiselle!"

Maman dit: "Pierre portera votre paquet." "Permettez-moi," dis-je.
Mamma says: "Peter will carry your parcel." "Permit me," say I.
Mamma says: "Peter will carry your parcel." "Allow me," I say.

Dans le paquet il y a une poupée pour Jeannette et une boîte à outils.
In the parcel there is a doll for Jenny and a box of tools.
In the parcel there is a doll for Jenny and a box of tools.

"Vous êtes très bonne," crions-nous. Que j'aime beaucoup Mademoiselle.
"You are very good," cry we. How I love much Miss.
"You are very kind," we cry. I like Mademoiselle very much indeed.

THE NEXT FRENCH STORY IS ON PAGE 6566.

A POEM FOR CHRISTMAS

THERE are many stories about the birth and boyhood of Jesus for which there is no authority in the Bible. That is to say, they are to be regarded, like many beautiful stories, as legends. In this poem Henry Wadsworth Longfellow tells the story of the homage paid to Jesus by the three Wise Men from the East. Though based largely on the Scriptural version, it is in some ways legendary. We are told in the New Testament that certain "wise men" from the East came to Jerusalem, having seen in the heavens a bright star which they supposed heralded the birth of the King of the Jews as foretold by the prophets. Instructed by the Jewish priests, they journeyed down to Bethlehem to do homage to the infant Jesus.

THE THREE KINGS

CONTINUED FROM 6334

THREE Kings came riding from far away,
Melchior and Gaspar and Baltasar;
Three Wise Men out of the East were they,
And they travelled by night and they slept by day,
For their guide was a beautiful, wonderful star.

The star was so beautiful, large, and clear,
That all the other stars of the sky
Became a white mist in the atmosphere,
And by this they knew that the coming was near
Of the Prince foretold in the prophecy.

Three caskets they bore on their saddle bows,
Three caskets of gold with golden keys;
Their robes were of crimson silk with rows
Of bells and pomegranates and furbelows,
Their turbans like blossoming almond-trees.

And so the Three Kings rode into the West,
Through the dusk of night, over hill and dell,
And sometimes they nodded with beard on breast,
And sometimes talked, as they paused to rest,
With the people they met at some way-side well.

"Of the Child that is born," said Baltasar,
"Good people, I pray you, tell us the news;
For we in the East have seen His star,
And have ridden fast, and have ridden far,
To find and worship the King of the Jews."

And the people answered: "You ask in vain;
We know of no king but Herod the Great!"
They thought the Wise Men were men insane,
As they spurred their horses across the plain,
Like riders in haste, and who cannot wait.

And when they came to Jerusalem,
Herod the Great, who had heard this thing,
Sent for the Wise Men and questioned them;
And said: "Go down unto Bethlehem,
And bring me tidings of this new King."

So they rode away; and the star stood still,
The only one in the gray of morn;
Yes, it stopped—it stood still of its own free will,
Right over Bethlehem on the hill,
The city of David, where Christ was born.

And the Three Kings rode through the gate and the guard,
Through the silent street, till their horses turned
And neighed as they entered the great inn-yard;
But the windows were closed and the doors were barred,
And only a light in the stable burned.

And cradled there in the scented hay,
In the air made sweet by the breath of kine,
The little Child in the manger lay,
The Child that would be King one day
Of a kingdom not human but divine.

His mother, Mary of Nazareth,
Sat watching beside His place of rest,
Watching the even flow of His breath,
For the joy of life and the terror of death
Were mingled together in her breast.

They laid their offerings at His feet;
The gold was their tribute to a King,
The frankincense, with its odor sweet,
Was for the Priest, the Paraclete,
The myrrh for the body's burying.

And the mother wondered and bowed her head,
And sat as still as a statue of stone;
Her heart was troubled yet comforted,
Remembering what the Angel had said
Of an endless reign, and of David's throne.

Then the Kings rode out of the city gate,
With a clatter of hoofs in proud array;
But they went not back to Herod the Great,
For they knew his malice and feared his hate,
And returned to their homes by another way.

THE FIRST NOWELL

You will find a selection of Christmas hymns and carols on pages 6105 to 6113. This quaint old carol is still remembered and sung, though not so commonly as some others. "Nowell" is an old way of spelling Noël, which is the French word for Christmas. How comes it that this word appears in an English carol? Anglo-Saxon speech, after England was conquered by the Normans, adopted many words from the Norman-French, and we find them in old English poetry. This carol tells the same story as Longfellow's The Three Kings.

THE first Nowell the Angels did say,
Was to certain poor shepherds in fields as they lay;
In fields where they lay keeping their sheep,
On a cold winter's night that was so deep.
Nowell, Nowell, Nowell, Nowell,
Born is the King of Israel.

They looked up and saw a star,
Shining in the East beyond them afar;
And to the earth it gave great light,
And so it continued both day and night.

And by the light of that same star,
Three Wise Men came from country afar;
To seek for a King was their intent,
And to follow the star wherever it went.

The star drew nigh to the North-West,
O'er Bethlehem it took its rest;
And there it did both stop and stay,
Right over the place where Jesus lay.

Then did they know assuredly
Within that house the King did lie;
One enter'd in then for to see
And found the Babe in poverty.

Then enter'd in those Wise Men three
Most reverently upon their knee,
And offer'd there in His presence
Both gold, and myrrh, and frankincense.

Between an ox-stall and an ass
This Child, truly there, born He was;
For want of clothing they did Him lay
All in the manger among the hay.

Then let us all with one accord
Sing praises to our heavenly Lord,
That hath made heaven and earth of nought,
And with His blood mankind hath bought.

A CHRISTMAS HYMN

This spirited Christmas hymn by Alfred Domett contrives to give a new turn to an old theme. It has been sung by countless poets, and he may be regarded as something of a genius who can bring a new thought to it.

IT was the calm and silent night!
Seven hundred years and fifty-three
Had Rome been growing up to might,
And now was Queen of land and sea.
No sound was heard of clashing wars;
Peace brooded o'er the hush'd domain;
Apollo, Pallas, Jove and Mars,
Held undisturb'd their ancient reign
In the solemn midnight
Centuries ago.

'Twas in the calm and solemn night!
The senator of haughty Rome
Impatient urged his chariot's flight,
From lordly revel rolling home.
Triumphal arches gleaming swell
His breast with thoughts of boundless sway;
What reck'd the Roman what befell
A paltry province far away,
In the solemn midnight
Centuries ago!

Within that province far away
Went plodding home a weary boor;
A streak of light before him lay,
Fall'n through a half-shut stable door
Across his path. He pass'd—for nought
Told what was going on within;
How keen the stars! his only thought—
The air how calm and cold and thin,
In the solemn midnight
Centuries ago!

O strange indifference!—low and high
Drowsed over common joys and cares:
The earth was still—but knew not why;
The world was listening, unawares.
How calm a moment may precede
One that shall thrill the world for ever!
To that still moment none would heed,
Man's doom was link'd, no more to sever,
In the solemn midnight
Centuries ago.

It *is* the calm and solemn night!
A thousand bells ring out, and throw
Their joyous peals abroad, and smite
The darkness, charm'd and holy now!
The night that erst no name had worn,
To it a happy name is given;
For in that stable lay, new-born,
The peaceful Prince of Earth and Heaven,
In the solemn midnight
Centuries ago.

MY PLAYMATE

A subdued note of melancholy pervades this poem by John Greenleaf Whittier. He revisits a scene made dear to him by memories of a little playmate. Time has worked great changes and taken the playmates far apart, but the old place they knew in youth is still hallowed to the one who lingers there.

THE pines were dark on Ramoth hill,
Their song was soft and low;
The blossoms in the sweet May wind
Were falling like the snow.

The blossoms drifted at our feet,
The orchard birds sang clear;
The sweetest and the saddest day
It seemed of all the year.

For, more to me than birds or flowers,
My playmate left her home,
And took with her the laughing spring,
The music and the bloom.

She kissed the lips of kith and kin,
She laid her hand in mine:
What more could ask the bashful boy
Who fed her father's kine?

She left us in the bloom of May:
The constant years told o'er
Their seasons with as sweet May morns,
But she came back no more.

I walk, with noiseless feet, the round
Of uneventful years;
Still o'er and o'er I sow the spring
And reap the autumn ears.

She lives where all the golden year
  Her summer roses blow;
The dusky children of the sun
  Before her come and go.

There haply with her jewelled hands
  She smooths her silken gown,—
No more the homespun lap wherein
  I shook the walnuts down.

The wild grapes wait us by the brook,
  The brown nuts on the hill,
And still the May-day flowers make sweet
  The woods of Follymill.

The lilies blossom in the pond,
  The bird builds in the tree,
The dark pines sing on Ramoth hill
  The slow song of the sea.

I wonder if she thinks of them,
  And how the old time seems,—
If ever the pines of Ramoth wood
  Are sounding in her dreams.

I see her face, I hear her voice;
  Does she remember mine?
And what to her is now the boy
  Who fed her father's kine?

What cares she that the orioles build
  For other eyes than ours,—
That other hands with nuts are filled,
  And other laps with flowers?

O playmate in the golden time!
  Our mossy seat is green,
Its fringing violets blossom yet,
  The old trees o'er it lean.

The winds so sweet with birch and fern
  A sweeter memory blow;
And there in spring the veeries sing
  The song of long ago.

And still the pines of Ramoth wood
  Are moaning like the sea,—
The moaning of the sea of change
  Between myself and thee!

I TRAVELLED AMONG UNKNOWN MEN

Wordsworth was very fond of the name Lucy, which occurs in several of his shorter lyrics. In this poem he touches a theme that has often inspired other writers. It is only when we travel "among unknown men" in foreign lands that we realize how dear is our homeland. The poem was written in 1799, and it was included in Poems Founded on the Affections, published in 1907.

I TRAVELLED among unknown men,
  In lands beyond the sea;
Nor, England! did I know till then
  What love I bore to thee.

'Tis past, that melancholy dream!
  Nor will I quit thy shore
A second time; for still I seem
  To love thee more and more.

Among thy mountains did I feel
  The joy of my desire;
And she I cherished turned her wheel
  Beside an English fire.

Thy mornings showed, thy nights concealed
  The bowers where Lucy played;
And thine too is the last green field
  That Lucy's eyes surveyed.

THREE YEARS SHE GREW

In this familiar poem of Wordsworth's we have another instance of his fondness for the name Lucy. We are not to suppose that the poet is here expressing a personal experience. Indeed, this poem was written in 1799, and was published in 1800 among his Poems of the Imagination.

THREE years she grew in sun and shower;
  Then Nature said: "A lovelier flower
  On earth was never sown;
This child I to myself will take;
She shall be mine, and I will make
  A lady of my own.

"Myself will to my darling be
Both law and impulse: and with me
  The girl, in rock and plain,
In earth and heaven, in glade and bower,
Shall feel an overseeing power
  To kindle or restrain.

"She shall be sportive as the fawn
That, wild with glee, across the lawn
  Or up the mountain springs;
And hers shall be the breathing balm,
And hers the silence and the calm
  Of mute insensate things.

"The floating clouds their state shall lend
To her; for her the willow bend;
  Nor shall she fail to see
Even in the motions of the storm
Grace that shall mould the maiden's form
  By silent sympathy.

"The stars of midnight shall be dear
To her; and she shall lean her ear
  In many a secret place
Where rivulets dance their wayward round,
And beauty born of murmuring sound
  Shall pass into her face.

"And vital feelings of delight
Shall rear her form to stately height,
  Her virgin bosom swell;
Such thoughts to Lucy I will give
While she and I together live
  Here in this happy dell."

Thus Nature spake—The work was done—
How soon my Lucy's race was run!
  She died, and left to me
This heath, this calm and quiet scene;
The memory of what has been,
  And never more will be.

THE TIDE RISES, THE TIDE FALLS

Longfellow here gives a fine example of contrast. Quietly he pictures the ceaseless ebb and flow of the tide, and suddenly he shows us the frailty of human life in contrast with the mighty force of nature.

THE tide rises, the tide falls,
  The twilight darkens, the curlew calls;
  Along the sea-sands damp and brown
  The traveller hastens toward the town,
And the tide rises, the tide falls.

Darkness settles on roofs and walls,
But the sea, the sea in the darkness calls;
  The little waves, with their soft, white hands,
  Efface the footprints in the sands,
And the tide rises, the tide falls.

The morning breaks; the steeds in their stalls
Stamp and neigh, as the hostler calls;
  The day returns, but nevermore
  Returns the traveller to the shore,
And the tide rises, the tide falls.

A DAISY AT CHRISTMAS

James Montgomery, the author of these verses, was born in Scotland in 1771, but spent most of his life in England. He died in 1854. He wrote these verses on finding a daisy in bloom on Christmas Day.

THERE is a flower, a little flower
With silver crest and golden eye,
That welcomes every changing hour,
And weathers every sky.

The prouder beauties of the field
In gay but quick succession shine;
Race after race their honours yield,
They flourish and decline.

But this small flower, to Nature dear,
While moons and stars their courses run,
Wreathes the whole circle of the year,
Companion of the Sun.

It smiles upon the lap of May,
To sultry August spreads its charms,
Lights pale October on his way,
And twines December's arms.

The purple heath and golden broom,
On moory mountains catch the gale;
O'er lawns the lily sheds perfume,
The violet in the vale.

But this bold floweret climbs the hill,
Hides in the forest, haunts the glen,
Plays on the margin of the rill,
Peeps round the fox's den.

Within the garden's cultured round
It shares the sweet carnation's bed;
And blooms on consecrated ground
In honour of the dead.

The lambkin crops its crimson gem;
The wild bee murmurs on its breast;
The blue-fly bends its pensile stem
Light o'er the skylark's nest.

'Tis Flora's page,—in every place,
In every season, fresh and fair;
It opens with perennial grace,
And blossoms everywhere.

On waste and woodland, rock and plain,
Its humble buds unheeded rise;
The Rose has but a summer reign;
The Daisy never dies!

THE DAY IS DONE

Few of Longfellow's shorter poems are more deservedly popular than this one. The longing for quiet and peace at the end of a day of strenuous toil has never been better conveyed in poetic form. The last stanza of the poem is a favorite quotation.

THE day is done, and the darkness
Falls from the wings of Night,
As a feather is wafted downward
From an eagle in his flight.

I see the lights of the village
Gleam through the rain and the mist,
And a feeling of sadness comes o'er me
That my soul cannot resist:

A feeling of sadness and longing,
That is not akin to pain,
And resembles sorrow only
As the mist resembles the rain.

Come, read to me some poem,
Some simple and heartfelt lay,
That shall soothe this restless feeling,
And banish the thoughts of day.

Not from the grand old masters,
Not from the bards sublime,
Whose distant footsteps echo
Through the corridors of Time.

For, like strains of martial music,
Their mighty thoughts suggest
Life's endless toil and endeavor;
And to-night I long for rest.

Read from some humbler poet,
Whose songs gushed from his heart,
As showers from the clouds of summer,
Or tears from the eyelids start;

Who, through long days of labor,
And nights devoid of ease,
Still heard in his soul the music
Of wonderful melodies.

Such songs have power to quiet
The restless pulse of care,
And come like the benediction
That follows after prayer.

Then read from the treasured volume
The poem of thy choice,
And lend to the rhyme of the poet
The beauty of thy voice.

And the night shall be filled with music,
And the cares, that infest the day,
Shall fold their tents, like the Arabs,
And as silently steal away.

ALADDIN

James Russell Lowell puts a great deal of thought into these sixteen lines. A long essay might be written to show that the beautiful dreams of youth are worth far more than all the gold one has gathered in old age, but nothing more could be said than is here conveyed.

WHEN I was a beggarly boy,
And lived in a cellar damp,
I had not a friend nor a toy,
But I had Aladdin's lamp;
When I could not sleep for the cold,
I had fire enough in my brain,
And builded, with roofs of gold,
My beautiful castles in Spain!

Since then I have toiled day and night,
I have money and power good store,
But I'd give all my lamps of silver bright
For the one that is mine no more.
Take, Fortune, whatever you choose,
You gave, and may snatch again;
I have nothing 'twould pain me to lose,
For I own no more castles in Spain!

A SIGH

IT was nothing but a rose I gave her,—
Nothing but a rose
Any wind might rob of half its savour,
Any wind that blows.

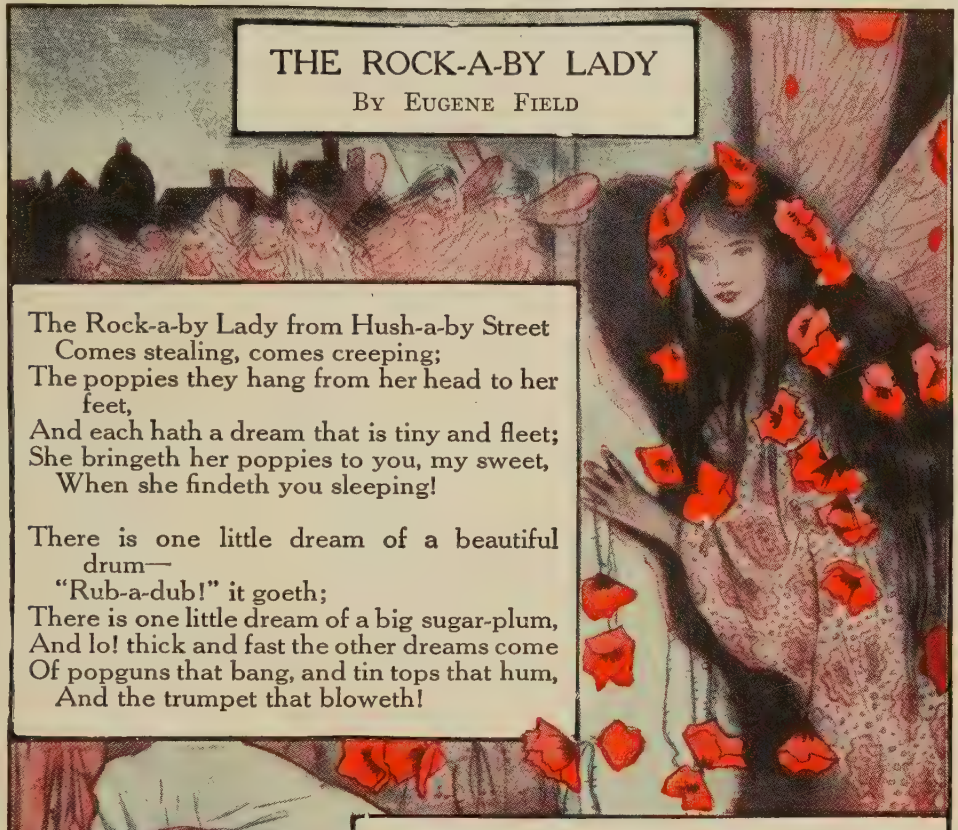
When she took it from my trembling fingers
With a hand as chill—
Ah, the flying touch upon them lingers,
Stays, and thrills them still!

Withered, faded, pressed between the pages,
Crumpled fold on fold,
Once it lay upon her breast, and ages
Cannot make it old!

—HARRIET PRESCOTT SPOFFORD.

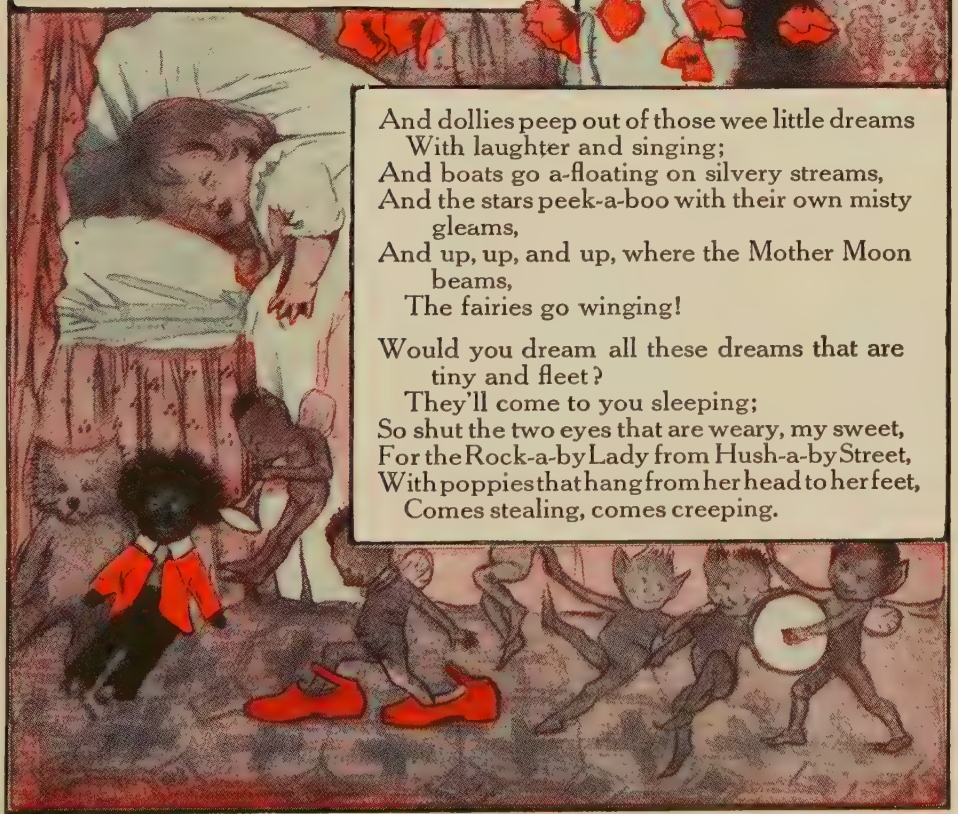
THE ROCK-A-BY LADY

By Eugene Field



The Rock-a-by Lady from Hush-a-by Street
Comes stealing, comes creeping;
The poppies they hang from her head to her feet,
And each hath a dream that is tiny and fleet;
She bringeth her poppies to you, my sweet,
When she findeth you sleeping!

There is one little dream of a beautiful drum—
"Rub-a-dub!" it goeth;
There is one little dream of a big sugar-plum,
And lo! thick and fast the other dreams come
Of popguns that bang, and tin tops that hum,
And the trumpet that bloweth!



And dollies peep out of those wee little dreams
With laughter and singing;
And boats go a-floating on silvery streams,
And the stars peek-a-boo with their own misty gleams,
And up, up, and up, where the Mother Moon beams,
The fairies go winging!

Would you dream all these dreams that are tiny and fleet?
They'll come to you sleeping;
So shut the two eyes that are weary, my sweet,
For the Rock-a-by Lady from Hush-a-by Street,
With poppies that hang from her head to her feet,
Comes stealing, comes creeping.

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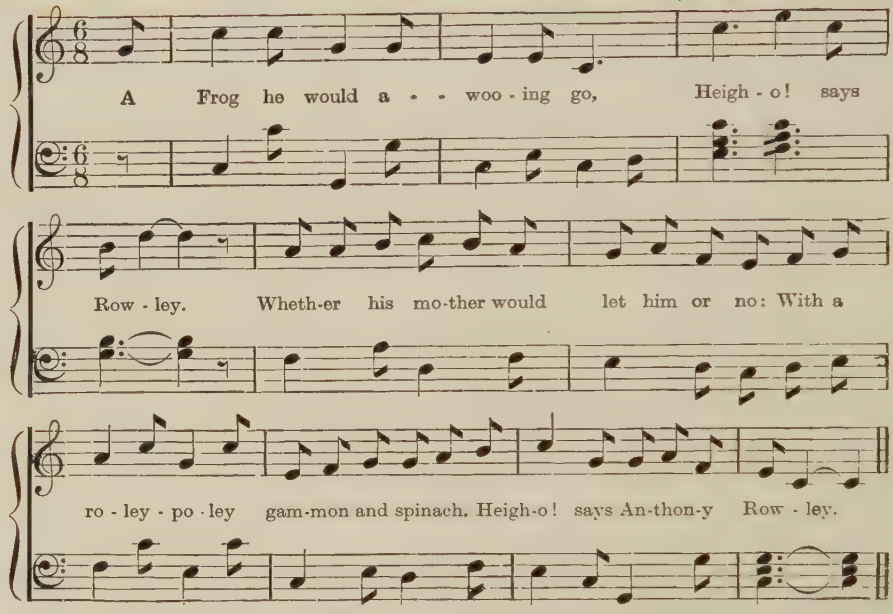
A FROG HE WOULD A-WOOING GO


A Frog he would a - - woo - ing go, Heigh - o! says
Row - ley. Wheth-er his mo-ther would let him or no: With a
ro - ley - po - ley gam-mon and spinach. Heigh-o! says An-thon-y Row - ley.

2. So off he set in his opera-hat,
Heigho! says Rowley.
And on his way he met with a Rat.
With a roley-poley, gammon and spinach.
Heigho! says Anthony Rowley.

3. Pray, Mr. Rat, will you go with me?
Heigho! says Rowley;
Pretty Miss Mousey for to see?
With a roley-poley, gammon and spinach.
Heigho! says Anthony Rowley.

HEIGHO! SAYS ANTHONY ROWLEY

4
They soon arrived at Mousey Hall,
Heigho! says Rowley,
They gave a loud knock and gave a loud call.

5
Pray, Miss Mousey, are you within?
Heigho! says Rowley.
Oh, yes, kind sirs. I'm sitting to spin.

6
Pray, Mr. Frog, will you give us a song?
Heigho! says Rowley.
But let it be something that's not very long.

7
Indeed, Miss Mouse, replied Mr. Frog.
Heigho! says Rowley.
My cold has made me as hoarse as a hog.

8
Since you have caught cold, Miss Mousey said.
Heigho! says Rowley.
I'll sing you a song that I have just made.

9
But while they were thus a-merry-making.
Heigho! says Rowley.
A Cat and her Kittens came tumbling in.

10
The Cat she seized the Rat by the crown.
Heigho! says Rowley.
The Kittens they pulled the little Mouse down.

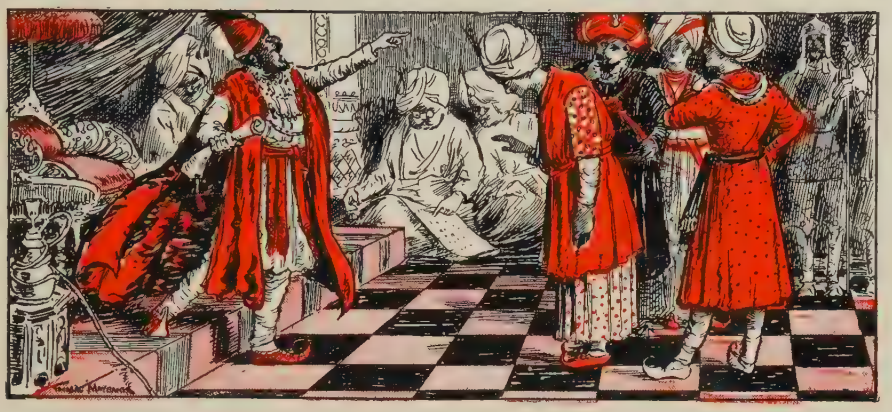
11
This put Mr. Frog in a terrible fright.
Heigho! says Rowley.
He took up his hat and he wished them good-night!

12
But as Froggie was crossing a silvery brook.
Heigho! says Rowley.
A lily-white Duck came and gobbled him up.

13
So there was an end of one, two, and three.
Heigho! says Rowley.
The Rat, and the Mouse, and the little Frogee.

Repeat last two lines of first verse after each verse.

Pretty flowers, tell me why
All your leaves do open wide
Every morning when on high
The noble sun begins to ride?
SYBIL SCOTT PALEY



THE FOUR WISE MINISTERS

CONTINUED FROM 6324

THERE was a certain king of Benares who had four wise ministers, and when he wanted to put a heavy tax on his people, they advised him not to do so. This made the king angry, and he stripped the four ministers of their wealth and honors and sent them out of the city.

As the four ministers were walking away from Benares they came to a track recently made by a camel, and began to talk about the animal. They were still talking about it when a merchant came up to them and said that he had lost his camel. One of the ministers asked him if it was not lame in one of its legs; another wished to know if it was not blind in the right eye; the third inquired if it had not a very short tail; and the fourth asked if it was not suffering from some stomach trouble.

"Yes," said the merchant eagerly; "you describe it better than I could myself. Where did you see it?"

"We have never seen it," replied one of the ministers. "But there is its track on the road."

"Why, you know it better than myself!" said the merchant angrily. "You must have found it and sold it. I shall complain to the king."

This he did at once, and the king recalled his four ministers and threatened to punish and imprison them if they did not confess the truth.

"If you never saw the camel," the king said, "how could you tell if it was lame, or blind, or short-tailed, or suffering from some disease?"

"I noticed it left only three footprints," said the first minister, "and I concluded it was lame in one leg."

"And I saw," said the second minister, "that the leaves of trees on the left side of the road had been eaten, while those on the right side were untouched. It seemed to me that the animal was blind in its right eye."

"Now and then," said the third minister, "there were faint specks of blood in the track of the camel. The camel must have had a very short tail, and was therefore unable to brush biting insects away."

"I observed," said the fourth minister, "that the camel's two fore feet were pressed firmly into the ground, while the sound hind foot scarcely touched it. I concluded, therefore, that the hind legs were drawn up by some pain in the animal's body."

On hearing these explanations, the king was overcome with admiration.

"When four men of your wisdom advised me not to impose a certain tax," he said, "I ought to have followed their advice. If you will forgive me and enter my service again, I shall always be guided by your counsel."

THE STORY OF LITTLE RED RIDING-HOOD

A LITTLE girl once lived in a cottage at the edge of a great wood. Her mother had made her a pretty little red cloak with a hood to fit over her fair curls, and she was so fond of it that she hardly ever wore anything else. And so everybody called her Little Red Riding-Hood.

At the other side of the wood was a tiny house among the trees, where Little Red Riding-Hood's grandmother lived all alone.

One fine afternoon Little Red Riding-Hood's mother said: "Your grandmother is not very well. In this basket I have put some eggs, a jar of honey and some butter. Put on your cloak and take them to her, with my love. But be sure that you do not stay long on the way, because it will soon be dark, and then, you know, the wolves come out."

So Little Red Riding-Hood put on her cloak and away she went.

But the wild flowers were very beautiful in the wood, and she put down her basket on the trunk of a tree and began to pick them.

Little Red Riding-Hood was very fond of flowers. She knew all their names, and she loved them so that when she spoke to them she thought they understood all that she was saying.

The little gray squirrels, with their funny long tails, darted out from the bushes and ran up the trees, where the birds were singing among the leaves. And Little Red Riding-Hood forgot all about the wolves.

Soon it began to grow dark, and remembering what her mother had said, she jumped up, and was picking up her basket, when there bounded up to her a great wolf!

"Where are you going?" asked the wolf. He spoke so kindly in his gruff voice that Little Red Riding-Hood thought he could not possibly hurt her. So she told him she was carrying some eggs and honey and butter to her grandmother, at the other side of the wood.

"Oh," said the wolf, "I know where that is!" And he ran on and was soon out of sight.

The wolf ran very fast, and did not stop until he came to the little house. He knocked at the door, and the grandmother's voice called out: "Pull the bobbin and the latch will go up."

He pushed open the door, and going straight up to where the old lady lay in bed, opened his mouth and devoured her! Then he put on her nightdress and cap, jumped into the bed, and cuddled down among the clothes so that only his head showed. Presently came a tap at the door.

"Pull the bobbin and the latch will go up!" called out the wolf in a voice like grandmother's.

The wicked greedy animal curled himself almost into a ball so that he would not look any bigger than the little girl's grandmother. And he licked his lips as the door opened slowly.

Little Red Riding-Hood walked in.

"Draw up a chair," said the wolf, "and tell me what you have in your basket."

Little Red Riding-Hood got a chair and sat down by the side of the bed.

"I have brought you something nice to eat, granny," she said, as she bent over the bed. "But what great ears you have, grandmamma!"

"All the better to hear you with," said the wolf.

"What great eyes you have, grandmamma!"

"All the better to see you with."

"And, oh, what great teeth you have, grandmamma!"

"All the better to eat you with!" cried the wolf, jumping out of bed.

Little Red Riding-Hood ran screaming to the door. The wolf ran after her, and had almost caught her, when a shot from a gun was heard, and the wicked wolf dropped down dead.

A woodcutter who was passing had heard the cries of Little Red Riding-Hood, and popped his gun through the window just in time to save her.

Little Red Riding-Hood was very grateful to the woodcutter, but she had been so frightened, and she was so grieved about her grandmother, that she ran weeping all the way home. When she came to the cottage she found her mother waiting for her at the door.

The mother drew Little Red Riding-Hood in and listened to her story of all that had happened. She was delighted to have her little girl home again, and Red Riding-Hood was so happy to be out of danger that she promised her mother never to be disobedient any more.

LITTLE RED RIDING-HOOD IN THE WOOD

THE WOLF BOUNDED UP TO RED RIDING-HOOD AS SHE GATHERED THE DAISIES IN THE WOODS

Little Red Riding-Hood found the flowers so beautiful that she stopped on her way through the wood to pick them. Soon it began to grow dark, and as she picked up her basket to go there bounded up to her a great wolf.

A CLEVER BAD MAN

THE STRANGE STORY OF VIDOCQ, A FRENCH DETECTIVE WHO ASTONISHED THE WORLD, AND LEFT A NEVER-TO-BE-FORGOTTEN NAME

TOWARD the end of the eighteenth century a baker living in the French town of Arras had a son born to him who was destined to astonish the world and leave behind him an almost imperishable name.

The baker's name was Vidocq, and he appears to have been a hard father, but very industrious and honest. By the time that little Vidocq was eight years of age the father's strap was in daily use. Whether he might have made something good out of his son by kindness and wise advice we cannot tell; all we know is that the little Vidocq was a bad boy, that his father constantly beat him, and that he grew steadily worse.

YOUNG VIDOCQ WAS WELCOMED WITH TEARS BY HIS POOR MOTHER, WHO ADORED HIM

When he was sent out with a basket of loaves he often stopped to talk to the thieves and low characters in the town, and was proud to be their friend.

He learned from these scoundrels how to steal money out of shop tills with a feather which had glue at the end. He robbed fowl-houses. He stole everything he could lay hands upon, and sold the articles in pawnshops. In vain his father flogged him. The boy appeared incurably bad, and he was sent to prison. This experience did not cure him, however, and directly he was set free he stole the money-box of his own father and ran away.

After varied experiences with showmen, menageries, Punch-and-Judy exhibitions, Vidocq returned home, famished and miserable, to be welcomed with tears by the poor mother, who loved and adored him.

We have not room to tell the full story of this extraordinary person, and so we must hurry over many of his adventures and come to the time when he made his first escape from prison. Locked up on a false charge, Vidocq escaped by means of a woman's disguise brought into the cell by his sweetheart. Instead of concealing himself or flying from the town he walked about in broad daylight, and at last went into a tavern. As he sat there a sergeant and four men approached.

"If you are looking for that rascal Vidocq," said the escaped prisoner, "hide in this pantry, and you will see him come in. When he enters the room I will make a sign to you."

No sooner were the five men safely in the pantry than Vidocq quickly turned the key upon them, and said: "It is

VIDOCQ ESCAPES IN SIGHT OF THE POLICE

On the day of his trial Vidocq, while waiting in a small room, put on the hat and cloak of a gendarme, who had left them there while he entered the court. Then, taking a prisoner by the arm, Vidocq passed out.

Vidocq who has locked you in. Farewell, my kind friends, farewell."

A few days after, he was caught and placed in a cell with another prisoner. This prisoner had begun to make a hole in the stone wall, and Vidocq assisted. Just before the day of his trial they thought the hole was big enough for them to escape through. Vidocq crept in, but the hole was too narrow; he could neither advance nor draw back. His agony was so great that his cries brought the sentry, and he was dragged out of the hole, bleeding and nearer death than life.

On the day of his trial he was taken with eighteen other prisoners to the court. They passed a corporal and a troop of soldiers, and entered an anteroom. There were two gendarmes in charge of them. One of these gendarmes put down his hat and cloak and entered the court. Hardly had the door closed than Vidocq slipped on hat and cloak, and, taking a prisoner by the arm, led him quietly to the other door, and passed out before the corporal and his troop.

He was taken again after a few months of freedom, but escaped very simply, because the jailer one night failed to fasten him in properly. The next time he was caught he found himself thrown into a cell occupied by two desperate prisoners. They told him that they were working their way through the stone floor, and that very soon they would be near enough to the river surrounding the prison to permit of their dropping quietly into the water and swimming away.

At last the burrow was complete, and all they had to do was to drop quietly into the river and swim to shore.

But they had miscalculated. Instead of having to drop into the water, as the last stone bulged out from its place the river came rushing in upon them, and poured, with a roar, up their tunnel. They had dug too deeply. When the jailers arrived they found the three prisoners splashing about in a flood.

After more adventures Vidocq was brought to trial on a charge of forgery. He was perfectly innocent, but his record was so bad, and the evidence against him seemed so clear, that he was pronounced guilty. And then was passed upon him by the judge the terrible sentence of eight years at the galleys.

"The chain of galley-slaves," says a writer of Vidocq's life, "linked two by two, set out upon the march for Brest. By day they toiled on foot, dragging a weight of fifteen pounds at either ankle, or rode upon long wagons, while their irons, white with hoar-frost, struck cold into their bones."

The galleys filled Vidocq with horror. To suffer them would have driven him mad. He soon made plans for escape. From one of the convicts he obtained a file, a wig, and a sailor's shirt and trousers. He filed at his chains till they were almost separated, put on his sailor's dress under the convict's garb, and while he was at work at the pumps, slipped behind some timber, snapped his chains, threw off his prison dress and, putting on his wig, escaped into the town.

But the greatest danger lay ahead. To get out of the town he had to pass the city gate, which was watched by an ex-galley-slave, a man who could detect a prisoner even by his walk. Vidocq, however, marched straight up to him, asked him for a light and then passed calmly out into freedom.

Soon after he was in prison again, for in France every tramp must show his passport to the police, and so it is very difficult for a man who is once down in the world ever to rise again.

This time he got himself into the infirmary by chewing tobacco which made him ill, and there, by wheedling one of the attendants, he procured a nun's dress, and so escaped.

He made his way in safety to a town where there was a tavern recommended to him by a convict. He found this house, gave the password, and was shown by the landlady into a room filled with desperate robbers, who started at sight of a nun. He was given clothes on condition that he would help in robbing a house. But Vidocq wanted to live an honest life. He escaped from these villains, and made his way home. Always, it seems, this desperate man had a tender regard for his mother.

It was unsafe for him to remain in his native town, and he set off for Holland. Many adventures befell him, on sea as well as on land, and at last he was captured again and once more sent to be a galley-slave, this time at Toulon. He was far worse off now than he had been

at Brest, for he was chained day and night to a bench with the foulest wretches in the prison.

Some time later he was placed with the working gang, and soon, with a file and a disguise, he managed to escape. But this time he found, to his horror, that no one could pass the city gate without a green card signed by the governor. As he stood wondering what he should do the gun sounded from the fortress, telling everyone of a prisoner's escape. At that very moment a funeral drew near, so Vidocq mingled with the mourners, and, in a flood of tears, safely passed through the gate.

He had not walked far when he fell in with a sportsman who asked him if he would join a band of sixty honest citizens who had taken to the woods rather than serve the press-gangs. Vidocq gladly accepted the offer, but soon found that the "honest citizens" were a gang of highwaymen.

One night a bandit declared that he had been robbed of his purse. Vidocq, as the newest recruit, was at once suspected. He was seized and stripped. No purse was discovered, but on his shoulder was the brand of a galley-slave.

It was instantly settled that he should be shot. Vidocq heard the muskets click, but at that moment an idea occurred to him. He whispered something to the captain. The captain agreed to his proposal. He prepared a bundle of straws, and said: "You will each draw one of these straws from the bundle, and the man who has stolen the purse will draw the longest."

When they had drawn, it was found that one of the bandits had a straw shorter than the rest.

"You are the thief," cried the captain; "for the straws were all of equal length, and a troubled conscience made you shorten yours." In this way Vidocq was saved; but he was sent off.

He disguised himself as a peasant, drove cattle, and made his way home; but later on he was recognized and arrested. Once more he escaped, and finally came to be a soldier. He distinguished himself and might have risen in the army had he not been recognized as a galley-slave.

He escaped by jumping a dizzy height from his cell window into the river which ran below. He became a tailor in Paris, and there his poor mother joined him. She loved him through all his troubles. But all the attempts he made to lead an honest life were in vain. He was arrested again, and was once more thrown into prison.

Weary of his life, Vidocq considered how he might deliver himself from the burden of his past, and on page 6791 of this book we read how he fared.

HOW THE THIEF WAS FOUND OUT

MOSTAFA, a wise and rich merchant of Damascus, had an only son, Said, whom he wished to train up in prudence; but Said trusted too much in a young Armenian, who managed to cheat him several times without raising his suspicions.

One day Mostafa and Said were compelled to go on business to Bagdad.

"Now with whom can I trust all my money during our absence?" said the merchant.

"With my friend, the Armenian, of course," said his son. "He is the most honest man in Damascus."

"Very well, Said," exclaimed the merchant. "For once I will rely upon your judgment."

He gave his son a large, heavy strong-box to intrust to the keeping of the Armenian, and when Said returned he took him to Bagdad. Two months afterward they returned to Damascus, having made a considerable amount of money out of the business they had done.

"Now, my son," said Mostafa, "go to your friend and get my strong-box."

Said went to the Armenian, and quickly returned in great anger.

"You have insulted my friend," he exclaimed. "It was not money you intrusted to his safe keeping, he says, but a mass of broken stones!"

"Pray, how did your very honorable friend find that there were only stones in my strong-box?" said Mostafa. "He must have broken the three locks, and this, I think, will now prove to you that it was well I intrusted him with nothing of any value."

Said hung his head, and thenceforward he allowed himself to be guided in his judgment of mankind by his father's wisdom and experience.

STORIES OF THE TALMUD

Among the volumes held sacred in the world to-day and for centuries past, the Jewish Talmud will always take a prominent place. It is regarded by the Jews almost as a second Bible, and a great part of it consists of traditions and laws that are said to have been handed down from the time of Moses by word of mouth. It contains the writings of all the greatest Jewish rabbis, or teachers, and consists of history, geography, poetry, law and theology, so that it is quite unlike anything else in literature. There is much that is dull and trivial; but there is also much that is wise and true, and there are many good stories, some of which are given below.

THE RICH MAN'S DIAMOND

A RICH Jew, who had a very poor neighbor, was told by a fortune-teller that some day all his wealth would

The wind carried his turban away.

belong to the poor man. This preyed upon his mind, so he sold everything, and with the money purchased a large diamond, which he sewed in his turban.

"Now," said he, "my poor neighbor can never obtain my diamond."

Some time afterward, when he was at sea, the wind blew his turban from his head, and it fell into the water and sank.

"At any rate," thought the Jew, "if I have lost the diamond, my poor neighbor can never get it."

But a few days later the poor man bought a fish in the market place, and upon cutting it open found the diamond.

THE BEAR IN THE WELL

A FOX and a bear were out walking together one day when, as they passed a house, they smelled the dinner cooking. The fox suggested to his companion that they should creep into the kitchen when no one was there and steal some of the food. But while they were in the kitchen the cook came in, and the bear was caught and punished.

For this he threatened to kill the fox; but the cunning fox said: "Pray do not let us quarrel. I will take you to another place where we shall certainly obtain plenty of food."

At night the fox led the bear to a deep well, and pointing to the reflection of the moon in the water said: "There is a fine cheese. We will go down and secure it."

He then got into one of the buckets at the end of the rope, and told the bear

"Do not let us quarrel," said the fox.

to get into the other. But as he was too light to balance the bear's weight, a large stone was placed with him in the pail.

As soon as the bear had entered the other bucket, the fox threw out the stone, and the bucket with the bear inside descended, and was left in the well.

THE EMPEROR AND THE FIGS

AN emperor, seeing an old man planting a fig tree, asked why he was doing this. The man replied that he might live to eat of the fruit; but even if he did not, his son might enjoy the figs.

The emperor accepted the present.

"Well," said the emperor, "if you do live to eat of the fruit of this tree, I pray you let me know of it."

The man promised to do so, and, sure enough, his life was prolonged until the tree grew and bore fruit which the old man ate.

Packing some of the finest of the figs in a basket, he set out for the palace, and when he arrived there and explained his errand, he was shown by the guards into the emperor's presence.

The emperor was so pleased that he accepted the present of figs and ordered the old man's basket to be filled with gold.

Now, next door to this old man there lived a woman who was very covetous, and, seeing his good fortune, she packed some figs into a basket and persuaded her husband to take them to the emperor in the hope of receiving, in return, a basket full of gold.

But the emperor, on learning the man's errand, ordered him to stand in the courtyard and had him pelted with the figs. When the man arrived home and told his wife all that had taken place, she consoled him by saying: "Ah, well! you may be thankful they were figs and not hard coconuts."

THE KING'S WATCHERS

A CERTAIN king who had an orchard of fig trees prized the fruit so highly that he determined to have the trees guarded in order that the fruit might not be stolen. For this purpose he placed in the orchard a blind man and a lame man.

The next day when the king visited the orchard he found that much of the fine fruit had gone, and he asked the watchers what had become of it.

"I do not know," replied one man.

"Nor I," said his companion.

The king then asked if they had eaten the fruit themselves.

"I could not steal the figs," said the lame man, "for I could not walk up to the trees."

"And I could not take them," said the blind man, "for I cannot see."

But the king was very wise, and he soon discovered that the blind man had carried the lame man, and that while the blind man had used his legs, the lame man had used his eyes and hands, and in this way the figs had been stolen. Both men were severely punished.

The king asked if they took the fruit.

THE LITTLE LOMBARD SENTINEL

A very popular work with the children of Italy is *Cuore,* which means "heart." It is written by E. de Amicis, in the form of a schoolboy's diary. Every month it contains a true story of a boy hero, and this story from *Cuore* has been translated by a clever little subscriber to the Book of Knowledge, Cesarina Cagnetta.

THE event written down in this little story happened in the year 1859, a few days after the battle of Solferino and San Martino, won by the Italians and French over the Austrians during the war for the liberation of Lombardy from the oppressive yoke of the latter.

One early June morning a little company of the Saluzzo cavalry wound its way slowly by a lonely pathway in the direction of the enemy. It was inspecting the country on all sides. The company was led by an officer and a sergeant; and all gazed silently into the distance, their eyes fixed, ready to see at any moment the white uniforms of the outposts of the enemy between the trees.

In this way they came up to a small cottage surrounded by trees. In front of the door a boy was standing; he might have been twelve years old. He was peeling a thin branch with his penknife to make himself a stick. From a window of the cottage a large Italian flag was fluttering in the gentle breeze, but the cottage itself was quite deserted. The peasants, having hung out the flag, had immediately made haste to run away for fear of the Austrians. The moment he saw the horsemen the boy threw away his stick and lifted his cap. He was a handsome lad, possessing an open face with big blue eyes and fair hair. He was in his shirt-sleeves; and the unbuttoned collar showed his bare neck.

"What are you up to?" asked the officer.

"What are you up to here?" asked the officer, stopping his horse. "Why didn't you leave with your family?"

"I have no family," answered the boy. "I am a foundling. I work a little for everybody. I am waiting here just to see the war and watch the Italians defeat their foes."

"Have you seen any Austrians pass?"

"No, not for three days."

The officer sat still, thinking a moment; then he dismounted, and leaving the soldiers, he went into the house and up on to the roof. The cottage was low, and from the roof he could see only a small stretch of country.

"One would have to climb a tree," thought the officer, and came down.

Just in front of the court a tall tree shot its leafy top into the blue sky. The officer was still lost in thought, looking first at the tree and then at the soldiers. All of a sudden he turned to the boy and said: "Can you see well, my lad?"

"Me? Oh, I could see a sparrow flying a mile away!" answered the boy.

"Could you climb to the top of that tree?"

"To the top of that tree? In half a minute!"

"And do you think you would be able to tell me what you see from there—if there are any Austrian soldiers in that direction, or clouds of dust, or guns that shine, or horses?"

"Of course I could."

"And what shall I give you for being such a help to us?"

"What shall you give me?" repeated the boy. "That's good! Nothing! If it were for the Austrians—never! But for ours! I am Lombardo!"

"Very well, then, climb up the tree."

"A second, while I take off my boots," said the lad.

He pulled off his boots, tightened the strap round his waist, threw his cap on the grass, and flung his arms round the trunk of the tree.

"But look out," exclaimed the officer, putting out his hand to stop the boy, as though a sudden fear had flashed through his mind.

The boy turned round to look at him, a question in his frank blue eyes.

"It is all right," said the officer. "Go on, climb up the tree!"

The brave boy climbed like a cat.

The boy was at the top of the tree.

"Look in front of you!" shouted the officer to the boy.

In a few seconds the boy was at the top of the tree, his body clinging to the slender trunk, his legs hidden by the branches; but from his waist upward there was nothing to shield him. The sun beat on his fair head, making it almost golden. The officer could hardly see him, he looked so small up there.

"Look right in front of you!" shouted the officer anxiously, as he gazed up at the lad.

The boy, to see better, loosed his right hand from the tree and shaded his eyes with it.

"What do you see?" asked the officer.

The boy leaned toward him, and putting his hand to his mouth, shouted: "Two men on horseback on the white road."

"How far from here?"

"Half a mile!" replied the lad.

"Are they moving?" asked the officer.

"No, they're not."

"What do you see?" questioned the officer, after a moment's silence. "Look to the right." The boy looked to the right.

Then he said: "By the cemetery, through the trees, there is something that glitters. I don't quite know, but I think it's bayonets."

"Do you see people?"

"No; I expect they're hidden by the cornfields that lie beyond the trees."

At that moment a bullet whistled high through the air and buried itself in the ground behind the cottage.

"Come down at once, boy!" shouted the officer. "They've seen you. I don't want anything else. Come down!"

"I am not afraid," answered the boy.

"Come down!" repeated the officer. "What is there to the left?"

"To the left?"

"Yes, to the left of you."

The boy leaned to the left. At that instant another bullet whistled through the air.

The ball had passed very near the tree.

"Come down!" shouted the officer in a kind of frantic, fierce command.

"I'll come down at once," answered the boy; "but the tree shields me. Do you want to know what there is to the left?"

"Yes," answered the officer. "But come down!"

"To the left," shouted the boy, stretching his body to that side, "where there's a little chapel, I think I see—"

A third ball cut through the air, and the boy turned. For a moment he seemed to cling to the trunk and branches, and then he fell head foremost, with open arms.

"Alas, the poor lad!" cried the officer, rushing up.

The boy fell on his back, his arms outstretched; a little stream of blood flowed from his left side. The sergeant and two soldiers leaped from their horses. The officer bent down and unbuttoned the boy's shirt. The ball had entered the left lung.

"He's dead!" exclaimed the officer.

"No, he's alive!" answered the sergeant, holding his hand.

"Poor boy—brave little fellow!" cried the officer. "Courage, courage!"

But while he was saying "Courage" and pressing his handkerchief to the wound, the boy opened his eyes wide and seemed to look at him, then his head fell back, and he died.

The officer turned pale. He held him for a moment longer, gazing at him, then

laid him on the grass. He got up and stood looking down at him; and the sergeant and the two soldiers stood motionless over him.

"Poor boy! but what a courageous little chap he was!" the officer repeated sadly.

Then he went into the house, took away the Italian flag and spread it over the little dead body, leaving only the face uncovered. The sergeant picked up the boots, the cap, the half-peeled stick, the knife, and put them all together at the boy's side.

They stood silent for a moment, then the officer turned to the sergeant.

"We will send the ambulance for him," he said. "He has died as a soldier; the soldiers shall bury him!"

When he had said this, he kissed his hand to the boy and shouted, "To horse!" The soldiers jumped on to their saddles, the company formed again, and they resumed their march. By the same road that the cavalry had trod that morning passed in the evening a large battalion of soldiers who had fought valiantly a few days before at the great battle of San Martino.

"Brave little fellow!" cried the officer.

The story of the boy's death had already spread among the soldiers before they left the camp.

The path, which was on the bank of a little stream, ran within a few steps of the cottage. When the first officers of the battalion saw the little body stretched at the foot of the tree and covered by the flag, they saluted with their swords; and one of them, as he passed, snatched a few blossoms and threw them on the little form.

Then all the men, as they marched, plucked flowers, too, and scattered them over that silent form. And officers and soldiers alike saluted him as they passed.

"Bravo, bravo, little patriot!"

One officer took off his medal for valor and threw it to the boy; another stooped to touch the cold forehead.

And the flowers still rained on his fair head. And he slept on in the grass, as though he was glad to have given his life for his dear country, Lombardia.

THE LAWYER AND THE OYSTER

AS two men were walking by the seashore they found an oyster, and began to quarrel about it.

"I saw it first," said one man, "so it belongs to me."

"I picked it up," said the other, "and so I have a right to keep it."

As they were quarreling a lawyer came by, and they asked him to give his opinion in the matter.

The lawyer agreed to do so, but before he would give his decision, he required that the two men should give him their assurance that, whatever he might say, they would be quite satisfied with his judgment.

Then the lawyer said: "It seems to me that you both have a claim to the oyster; so I will divide it between you, and you will then be perfectly satisfied."

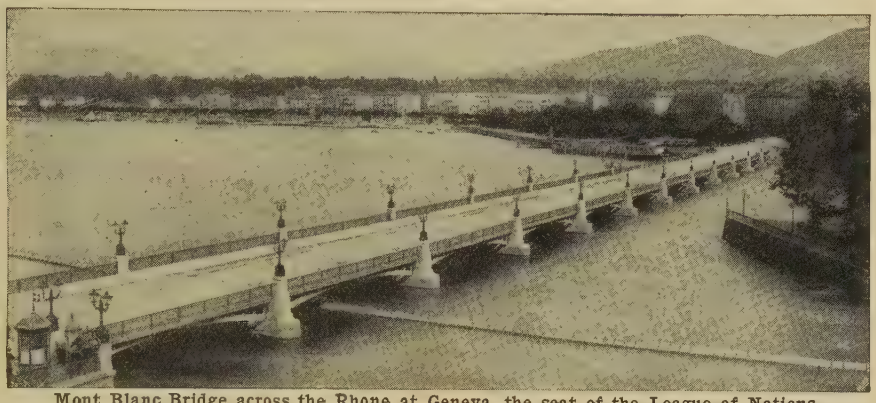
Opening the oyster, he quickly ate it, and very gravely handed to each of the men one of the empty shells.

"But you have eaten the oyster!" cried the men excitedly.

"Ah, that was my fee for deciding the case!" the lawyer calmly replied. "But I have divided all that remains in a fair and just manner."

That is what generally happens when two quarrelsome persons go to law.

THE NEXT STORIES ARE ON PAGE 6503.



Mont Blanc Bridge across the Rhone at Geneva, the seat of the League of Nations.

CO-OPERATION

CONTINUED FROM 6362

ALL we have learned about the production of wealth leads to the conclusion that by working together men can do far more for themselves as individuals than by working against one another. This principle of working together we call co-operation.

Co-operation, while it means combined effort, does not mean the loss of individual initiative, enterprise or effort. If it did, it would be valueless, because it is necessary that the powers of every boy and girl be fully developed. It would be a bad thing for society if individuals merely worked like cogs in a machine, without knowing why they were at work.

There is no better way of illustrating the true conception of co-operation than by a football team. As every boy and girl knows, it consists of eleven players. The eleven go into the field to play the game, as we say. It is the thing to play for your side and not for yourself. The game is instinct with fair play. It is a matter of the combined, or co-operative, effort of eleven individuals, each with brains of his own, powers of his own, and ideas of his own.

How is it done? How is it that each player gets a good game as an individual, while the first principle of the game is to study the interest of one's side and not of oneself? The answer is, first, that the game has definite rules which each player consents to obey. These rules make the very life of the game. It is because each player obeys the rules that each player gets his pleasure. There would be no pleasure if there were no rules and every player did whatever pleased him at the moment.

Then, too, each member of the eleven, in addition to obeying the general laws, also agrees to obey the captain. This captain places the members of the team in the field according to their individual abilities, and decides the order of the plays. By obedience to these commands each member of the team gets his best individual chance.

The best results in work are obtained in the same spirit of enlightened self-expression. In mutually directed efforts individuals can find the most complete satisfaction of their own working powers. Happiness, as well as fruitfulness in work, follows such co-operation. Doing his best in a game, the player enjoys not only his own efforts, but the approval and the esteem of his fellow-players. Doing his best in co-operative work, the worker can gain for himself precisely the same individual and social happiness.

TRADE THE SERVANT OF THOSE WHO ARE ITS CUSTOMERS

In analysis, all the varied occupations which are carried on within our country are co-operative so far as they are useful. In the long run no industry can survive unless it meets the needs of a number of people sufficient to sustain it. Whether a man sees or not that his industry is really a servant of those who are its customers, it is nevertheless true that it is part of a scheme of service. It is curiously true that sometimes a man who imagines himself to be a selfish creature, who thinks of nothing else but of looking after, as he would say, "Number One," is really working hard all the day and all the year to serve others, and leaving himself very little leisure in which to do anything for himself.

Fortunately, people are becoming more and more conscious of the mutuality of work—of how one occupation is dovetailed with another, of how industries depend on one another, and of how necessary it is for all the individuals working in an industry to have harmonious relations.

Thus we see the managers of industries working together in trade associations, which have central offices and meeting-places where they discuss from time to time the progress of the industry—how to make improvements in its products or its methods, and how best the general interest of the whole of the members can be served by individual action just as in a game of football.

THE PARLIAMENT OF INDUSTRY WHICH MAY COME SOMETIME

We see also the workers in industries drawn together in trade societies, which are formed to help the workers. No doubt, as time goes on, these will be more and more closely associated with the actual governors of industries, so that each industry will become a body co-operative within itself and a conscious servant of the public. Whether it knows it or not, any industry is a public servant, and the more it is conscious of the fact, the better for it and for the nation.

The suggestion has been made, and is more and more heard of, that work should be aided by a parliament of industry. It would be representative of both employers and employed, and its main principle would be the idea of co-operation between all trades in the national interest for the production of more wealth under healthy and harmonious conditions. It might prevent disputes by helping people to understand one another. It might help every industry to see that it is part of a working whole, and that if one industry fails, or stops work, it injures all other industries.

THE GREAT OPPORTUNITY THAT COMES TO THE CHILDREN OF TO-DAY

So each working section of the nation might come to understand and appreciate the others. Here, surely, is a great idea for children to grow up with, so that when they come to take part in the serious business of life they may try to understand what a wonderful thing the work of a great nation is, and help to make it better, happier and more fruitful.

Among the things in which there has been more and more co-operation in work is the effort to make occupations safer for those who work in them. So a "Safety First" campaign has arisen. More care is taken than of old in safeguarding workers from being killed or injured by faulty appliances, bad methods or unguarded machinery.

There is also the question of making work-places clean, well ventilated and comfortable as well as safe. Many good employers now provide those who serve them with fine rest-rooms, dining-rooms, lockers and lavatories. It is also becoming more and more widely understood that if work is done under the best conditions, in roomy places where there is plenty of light streaming in from large windows, where there is ample space in which to move about, and where the air is not too cold in winter or too hot in summer, far more wealth can be produced by the same amount of effort than in unhealthy, badly arranged, crowded workrooms.

But it is not alone in our own country that we have to consider this important principle of co-operation. The World War has helped many people to see that what is true of trade inside a country is also true of the trade of the world as a whole.

The German Empire, the Austro-Hungarian Empire, Turkey and Bulgaria suffered defeat after four years of warfare. The British Empire, France, Belgium, Italy, the United States and their allies were triumphant.

WHY THE WORLD BECAME POORER AFTER THE WORLD WAR

What was the effect upon trade? Did the victors find a great prosperity in their

success? Are our people, or any people in the world, whether they took part in the war or whether they did not, really better off?

We know that every country in the world is worse off than before the beginning of the great conflict. The victors are suffering as well as the vanquished. Old trade connections were broken. Men in different countries ceased to have faith in each other's power to meet their bills. Traders no longer believed in each other's credit. So a large part of the trade by which the world lived disappeared, and all the world became poorer.

It is possible to sum up all this quite truly in a few words by saying that after the war the world was poorer, and we were poorer with it. One of the reasons is that the world had ceased to co-operate as fully as it co-operated before the war began.

World-trade is in essence just as much a scheme of co-operation as is trade within our own borders. We buy abroad and sell abroad for precisely the same reason that people within a country buy from, or sell to, one another. Trade is not a one-sided thing, but a matter of mutual interest. If we buy sugar from, or sell wheat to, Cuba, it is good for both Cuba and ourselves.

The civilizing effect of trade between nations

World-commerce as it was before the war amounted to a redistribution of goods and services all over the world, which made for the comfort and prosperity of every part of it. Nothing is more unwise or untrue than to regard trade as a sort of warfare. If a ship leaves one of our ports, taking lumber, flour or meat to some foreign country, it is not a deed of cunning, nor do the goods bombard the place to which they are taken. They go out because they have been bought by someone to whom they will be useful, and when we export to a nation we serve that nation even while we serve ourselves.

So it is with imports. The nations which send us goods do not injure us. On the contrary, we buy abroad what we need, and when the purchases arrive they serve us, just as our exports serve others. Of course, it is clear that if we can transform our raw material into a finished product and then sell the product, we get an additional advantage.

We could not exist as a great nation without the supplies we received from abroad, for not only should we be without certain articles of food, but some of our factories would be without the raw materials which are the food of work. An account of our imports is really an account of the services which the world performs for us. An account of our exports is really an account of the services we perform for the world. The two acts balance each other, and that is an expression of co-operation.

The progress of the world has arisen from the extension of commercial relations. It is by no means a thing to deplore that different nations have different natural resources and that their peoples have varying attributes. It is the very variety of different lands and different peoples which gives savor to humanity and interest to the intelligent man who surveys the globe.

How the work of man is always increasing in value

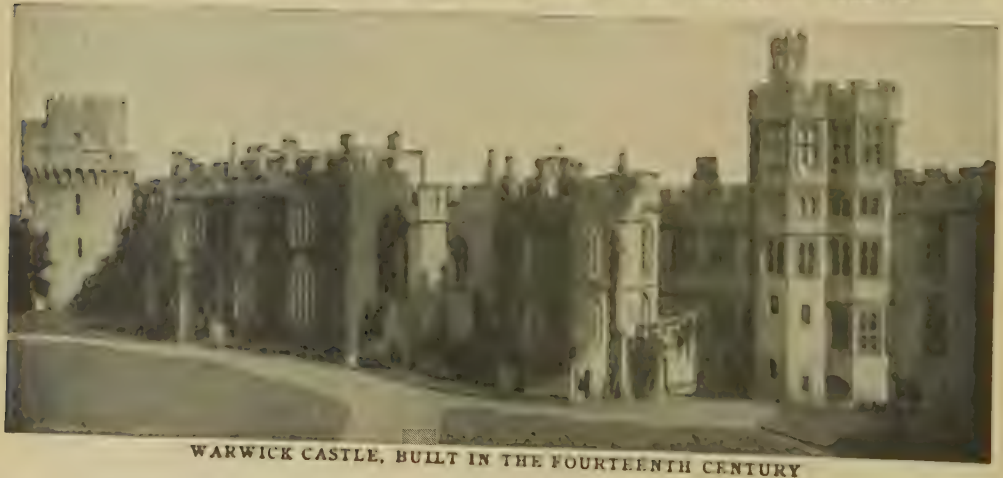
If we go back for no more than two hundred years, we have a picture of a world each part of which was largely self-contained. Not very much trade was done then even within a country. Each little locality lived mainly upon itself. As a consequence the average man could exchange his work only for that of a few people who lived about him. That meant that his work had quite a limited value to him. He could not, for example, change work, as we can, for bananas from the West Indies, or the products of looms in Great Britain, or a beautiful ornament made in Paris. He was confined to the consumption of those things which either the natural fertility of local soil or the native skill of his neighbors could supply. However hard he worked, the results of his work were strictly limited in character.

How different is the lot of the civilized worker of to-day, who, by reason of the accomplishments of commerce, which rest essentially upon the wonderful work of the engineer in building railways and steamships, can exchange his work for such a variety of articles as could not be commanded even by the richest men two hundred years ago! We can get for a few cents a tropical fruit which kings had not tasted in 1750. The poorest boy can enjoy dozens of things which the richest man did not have then.

THE NEXT STORY OF OUR OWN LIFE IS ON PAGE 6875.

WINDSOR CASTLE, THE HISTORIC HOME OF THE KINGS OF ENGLAND

BURGHLEY HOUSE, NEAR STAMFORD, BUILT IN THE SIXTEENTH CENTURY



WARWICK CASTLE, BUILT IN THE FOURTEENTH CENTURY

St. John's College, Cambridge.

FOUR CENTURIES IN EUROPE

CONTINUED FROM 6311

THE Gothic period in England produced a very finished architecture that was much more suited to cathedrals and churches than any other kind of building. We might almost say that the Englishman's church came to life fully grown, but it took some centuries for the "stately homes of England" to reach perfection.

Feudal times developed the castle that was more like a fortress than a house and not very comfortable to live in. The coming of the Normans added to the rude Saxon castles certain Norman styles such as the square keep, or chief tower, of the castle, like the White Tower of London.

In the thirteenth century the castle became a little more human. The great hall of the Norman keep had served as dining-room, bedroom and sometimes kitchen. Now we find rooms were built for guests in a sheltered part of the castle. Another hundred years or so and a banqueting hall, kitchens and other rooms were added. Warwick Castle and Warkworth, Northumberland, are most interesting specimens of these early domestic fortresses. In Scotland the best known is Glamis, in Forfarshire.

The castle gave place, as social conditions changed, to the manor house. This was like a little village. The house itself grouped around a large hall which had a fireplace and was generally backed by the kitchen, which also had a fireplace. In all the house no other fires were possible. From this central hall ran out, right and left, the rest of the house, rooms opening into each other, upstairs generally branching out from an open gallery that looked down into the hall.

The house was of stone or sometimes brick. The windows were very small, and in the earliest period were merely shuttered; later came those leaded casements which we are so fond of putting into new country cottages built on old lines. Around the manor house were built the various smaller places which in those days supported life: the dairy, bakehouse, brewhouse, smith's house, and so forth. Nearly always, too, there was a private chapel somewhere on the manor's precincts.

As the need for fortification ceased, the manor house spread itself out more, added courtyards and wings, summer and winter parlors, and a great many private rooms. Houses of this order are Penshurst Place in Kent and Haddon Hall in Derbyshire.

The reign of Henry VIII saw the

last great building set up in England before the echoes of the Italian Renaissance upset the architects of Elizabeth's reign. This is Hampton Court Palace, built by Cardinal Wolsey for himself and liked so much by Great Harry that the cardinal thought it tactful to make his master a present of it. The king made certain additions, and later Sir Christopher Wren found it necessary to pull down the east part and rebuild it in Renaissance style.

The interest of the palace is the original Tudor building, erected in the style that had developed by way of the English manor house, and lightly flavored by the work of the Italian craftsmen Wolsey drew in. The famous Clock Court, built in a diaper-patterned brickwork, with battlemented parapets and delightful Tudor chimneys, is an eternal treasure. In the court we see the square-headed windows, the low graceful mullions, the fine oriel of the gatehouse, and recognize what early Tudor domestic architecture, born of English Gothic, means.

The great hall of the palace is one of the finest in Europe. Its hammer-beam roof, with that of Westminster Hall, built centuries earlier, and that of the Middle Temple Hall, London, built a little later, are souvenirs of great bygone genius in workmanship.

WHAT WE MEAN BY THE "TUDOR CHAOS"

The houses built in Elizabeth's reign were of a different character—in a way had fallen from grace—were of a confused style, over-ornamented, decorated with Italian details regardless of suitability by German and Flemish workmen who were in England in great numbers at the time. In architectural history these years between the Gothic and the Renaissance are termed the "Tudor chaos." The half-timber constructions, the gables, the quaintness will always be interesting, even if the façades show too many curls and twists.

The interiors of the Elizabethan houses were very richly carved and planned. The great hall was still so much the core of the building as to draw to itself all that was most lovely in the work of the time—in paneling, fireplaces, windows, open-beamed carved roofs. Great staircases and the "long gallery" became notable features of the Elizabethan mansion. Outwardly, in plan the E-shaped formation appeared, as if a quadrangle had been cut in half to let in sunlight and air.

Little Moreton Hall in Cheshire, Longleat House in Wiltshire, and Sizergh Castle in Westmoreland are three characteristic houses in a reign that produced a great many. As the Elizabethan period slid into the Jacobean and the Renaissance influence became more strongly felt, another great company was added: mansions like Audley End in Essex, Hatfield House in Herts, and Holland House in Kensington.

Magnificent buildings of a public nature rose in England during the Gothic years and early Renaissance: most of the colleges and chapels of Oxford and Cambridge, the main part of the Inns of Court, London, the guildhalls, schools, hospitals and almshouses (for these were the centuries when for pious motives people endowed hospitals and almshouses for the needy and the infirm). The oldest almshouse in England is the Hospital of St. Cross, built in 1136 and endowed by Bishop Henry of Blois for "thirteen poor and aged men." The fine old Bede House, Stamford, was built in 1490 for "ten poor men and two nurses."

THE RENAISSANCE AND INIGO JONES

We have now reached a dividing line. The first person who greets us on the other side is Inigo Jones—not that he was the first Renaissance architect, but that he stood above the company. Once the sixteenth century has passed, English architecture is looked at from the point of view of two giants, Inigo Jones and Christopher Wren.

Inigo Jones, the son of a cloth-worker, was born in 1573 in the parish of St. Bartholomew's, Smithfield. When he was still a young man he made two journeys to Italy and rambled all over the country with Palladio's book on architecture. He came back steeped in Italian architecture; in 1615 he was given the post of Surveyor-General of His Majesty's Works and began his labors as an architect.

His first great work, started in 1619 and carried over many years, was the rebuilding of Whitehall Palace. Owing to Charles I's being so short of money only the banqueting hall was finished—now the United Service Museum in Whitehall. This is the first true Renaissance building to be set up in England; we see for

the first time the pilasters, pediments and balustrades of the Italian art.

Inigo Jones showed himself at once capable of managing large masses of architecture from the point of view of proportion and distribution of weight. After this he was kept very busily employed. His next important work was the planning of the group now known as the Greenwich Hospital. He built Queen Henrietta's House for the wife of Charles I, and thus set going a magnificent group which Wren finished and which Queen Mary turned into a hospital for disabled seamen. He was fined and imprisoned in the Civil War, but as soon as the turmoil was over, continued his building again. He died in the midsummer of 1652 and was buried by the side of the old cloth-worker, his father, in St. Benet's Church, which Wren rebuilt thirty years later.

CHRISTOPHER WREN AND HIS GREAT ACHIEVEMENT

Christopher Wren, the second great architect of the century, was born in 1632 and busied himself till he was nearly thirty on scientific problems, astronomy and various inventions. In 1661 he was appointed Assistant Surveyor-General of His Majesty's Works, the post Inigo Jones had held. His first works were Pembroke College Chapel, Cambridge, and the Sheldonian Theatre, Oxford. The master's best work in Oxford is the interior of Trinity College Chapel.

A brief six months in Paris, where he met Bernini, the Italian, and the other best artists of the age assembled for the building of the Louvre, then he came back to London, where the Great Fire gave him the most wonderful opportunity that any architect ever had. On page 4356 you may read more about him and his plans for this work. He built fifty-three churches within the sound of St. Paul's bells, of which his finest is generally supposed to be St. Stephen's, Walbrook, and his loveliest steeple that of Bow Church. The pinnacle of his fame is St. Paul's Cathedral, whose dome is one of the finest in Europe. The interior of St. Paul's has the lofty, rather heavy grandeur of a Renaissance church.

To think of the work Wren accomplished before he died, at the age of ninety-one, is to be amazed! Fifty-four churches, eight colleges, thirty-five halls of various kinds, four palaces, in part and whole, and about fifty other works of varying importance, such is his record. When the giant died he had, like Michelangelo, many followers, none of whom could in any way measure forces with him. For now the true Renaissance had risen to its height and was sinking.

EIGHTEENTH-CENTURY ARCHITECTURE IS SOUND AND PLEASING

There was in England during the early part of the eighteenth century a widespread interest in architecture. The reconstruction of the city by Wren had stirred not only the architects, masons and carpenters employed, but all the society of London. When Queen Anne passed an act for the building of another fifty churches in 1711, this interest grew. The erection of private houses became the fashion. Everybody who could afford it must have a new house built in what was left of the Renaissance style. Nothing was produced save on Italian lines, and although no buildings arose that even faintly rivaled the creations of Inigo Jones and Wren, most of the architecture of the eighteenth century was sound in construction and pleasing in appearance.

A great many names are connected with the century: John Vanbrugh (1664–1726), whose best-known works are large country mansions like Castle Howard and Blenheim Palace; Nicholas Hawksmoor, who was at various times assistant to Wren and Vanbrugh, and whose St. George's, Bloomsbury, Renaissance style, is one of the finest in London; the Adam brothers, whose buildings left a stamp on London and whose doorways and fireplaces are very striking; and William Chambers, who built Somerset House.

THE GOTHIC AND CLASSIC REVIVALS IN ENGLAND

During the first half of the nineteenth century the architecture of England was passing through a state of chaos owing to what are now called the Gothic and classic revivals. The interest of the country was divided between these two styles, and an enormous amount of building was done which lacked the dignity of the eighteenth-century architecture, its quietness, its comeliness, its "Englishness."

It is always a bad sign in the history of a country's architecture when men go back to a remote period and slavishly copy it instead of adapting its principles to the needs, climate and social life of their own country. St. George's Hall,

Liverpool, is described as the most perfect design of the classic revival, but because of the climate it is hopelessly wrong. The classic halls and temples of Greece and Rome were constructed of shining white marble and stood under deep blue skies, gleaming in the clear air. Every plain clear-cut line had its full value: there was no need to peer in the gloom to see where the pillar began and the shadow ended. In London the Royal Exchange, the British Museum, the National Gallery, the Athenæum Club are all outstanding examples of the classic revival.

The Houses of Parliament are by far the best work of the Gothic revival. A great many of the well-known and much-loved buildings of London have already been mentioned in our story of Great Builders of London. In other parts of England the nineteenth century saw the setting-up of a tremendous array of buildings: the Scottish National Portrait Gallery, by Sir Rowand Anderson; the Rylands Library at Manchester, by Basil Champneys, who also built Girton and Newnham Colleges, Cambridge; St. Mary's Cathedral, Edinburgh, by Sir Gilbert Scott the elder.

Modern architecture in England

As the nineteenth century drew toward its end these fashions in architecture died out. Men began to think again of Inigo Jones and Wren, who had adapted Renaissance ideas and made something English of them. This harking-back to their own two great geniuses was the beginning of a really fine thing—modern English architecture, which is not a slavish imitation of any one style and is slowly developing into something which will presently belong in spirit to England alone.

One of the most notable pioneers of this modern architecture was R. Norman Shaw, R.A., who lived from 1831 to 1912. His earliest building of note was the New Zealand Chambers in Leadenhall Street, then the Gaiety Theatre, the Piccadilly Hotel and the New Scotland Yard.

The New War Office by William Young and the College of Science by Sir Aston Webb are notable new buildings in the new manner. Liverpool will make the century famous with its magnificent new Cathedral of the Church of Christ by Sir Giles Gilbert Scott. In various parts of England a number of very beautiful country houses have been built by Sir Edwin Lutyens, who also designed the Cenotaph in Whitehall. This great architect has also left his stamp most magnificently on modern Delhi, India, by the government buildings there, and on Johannesburg, South Africa, by the imposing Art Gallery.

The development of the chateaux of France

The Gothic builders of France not only erected the cathedrals which are the country's glory and pride, they set up also a number of castles and private palaces. These are generally known as châteaux, and they passed through the same developments as the English castle.

The earliest were built by powerful princes and kings. When the feudal system died out and private individuals, through industry and trade, grew to power, some very fine houses were built for them. As in the case of the English halls, varying periods have set their mark on these great homes of France.

Many of these were destroyed in the Revolution, others fell into ruin during the course of years. One of the earliest and most famous was carefully restored by Viollet-le-Duc, a clever architect of nineteenth-century France, and is now open to the public. This is the Château de Pierrefonds near Compiègne, in northern France. It was built by Louis of Orleans about 1396 on a rocky height above the village, and gives us to-day an excellent idea of what a French medieval castle was like.

Pierrefonds is foursquare in shape, surrounded by an immense battlemented wall twenty feet thick which rises sheer from the rock; eight loopholed towers 115 feet high are built into the wall, one at each corner and in the centre of each side. Within this enormous mass of protecting masonry lie the buildings of the castle, grouped round a courtyard.

For two hundred years Pierrefonds was a powerful fortress. We can imagine the castle, with its moat and drawbridge and fortified towers, rearing itself above the surrounding country, a menace to enemy forces, a symbol of pride and power. Early in the seventeenth century it was dismantled. During the Revolution it was sold, and bought later by Napoleon. It now belongs to the French nation.

Waddesdon Manor in Buckinghamshire.

Wren's Orangery in Kensington Gardens.

Hardwick Hall in Derbyshire, built at the end of the sixteenth century.

Old Almshouses at Haslemere, in Surrey.

The Quadrangle of Eton College.

The walled towns of France give us another glimpse of medieval Europe. We can trace the course of the country's history by the ruins of monstrous walls that still stand around certain towns. The ramparts of Dinan and St. Malo in the north draw the eye and mind of the holiday-maker into another world. In the south of France are three of the most remarkable walled towns in Europe: Avignon, Carcassonne and Aigues Mortes.

THE HISTORIC OLD BRIDGE ACROSS THE RHONE AT AVIGNON

Within the ramparts and towers that girdle Avignon rises the magnificent palace built by the popes during their residence in France from 1309 to 1377. Part of the famous bridge across the Rhone, the Pont Saint-Bénézet, still stands. It is a wonderful piece of architecture, first built about 1177 by the Guild of Bridge-builders to connect the old town with the new. Built on to one of the piers, halfway across the river, stands the little chapel of Bénézet, the patron saint of the bridge. One of the most popular children's songs in France is written around the structure:

Sur le pont d'Avignon
Tout le monde y danse en rond.

We can see more of the grimness of this forgotten architecture in the walls of Carcassonne and Aigues Mortes.

HOUSES THAT CHANGED THEIR CHARACTER THROUGH THE CENTURIES

There are many fortress castles in France which threw off their warlikeness in later centuries and kept nothing of the ancient château but its name. The most beautiful are in the Loire district, and they display some exquisite features of early French domestic architecture, such as the ornamented gateways and the spiral staircases.

The Château de Josselin, in Brittany, dates from the twelfth century, but was rebuilt about four hundred years later in the most picturesque period of the French development. To this period also (early sixteenth century) belongs the Château de Bury, with its large square court, its many-towered entrance. This château is typical of many country houses of the transition period when Gothic was changing into Renaissance. Another famous building is the Château de Chambord, on the Loire. It is massed round two rectangular courts, one within another. All that was rich and elegant of the period in design, masonry and sculpture is to be found in this château. Its carved turrets, chimneys and dormer roofs cluster behind the immense outer walls and barricading towers. At Chambord is one of the corkscrew staircases popular in this period. It is a curious double stair, and is so constructed that people can ascend and descend at the same time without being visible to each other.

ONE OF THE MOST FAMOUS COUNTRY PALACES IN THE WORLD

Other well-known country houses are the châteaux of Chenonceaux, Azay-le-Rideau, St. Germain-en-Laye. The Luxembourg was built, a little later, for Marie de Medici, the wife of Henry IV, by De Brosse. This is different from other such buildings because Marie wanted to pretend that, though living in Paris, she had a home something like the Medici palace in Florence. Hence the grand, Tuscan air of the Luxembourg. A little later still came buildings like the Château de Maison-Laffitte, country houses where a gentleman could receive his guests in state.

Among all these the Château de Blois stands out as one of the most famous country palaces in the world. Its various buildings are grouped round an irregular courtyard, and show where the builders of the thirteenth, fifteenth, sixteenth and seventeenth centuries were employed. It has dormer windows with lovely carved roofs; elegant cornices run along the façades. Here Italian art mixes most curiously with Gothic, after the fantastic shapes of the early Renaissance, and we get the cold stateliness of its full expression. Inside, the fireplaces, panelings, woodcarvings and statuary show the treasures of a country rich in art.

The most famous details of Blois are the entrance built for Louis XII, and the staircase, designed, it is said, by Leonardo da Vinci for Francis I. The staircase winds up through a five-sided tower which projects from the face of the wall. The tower is open at each story, and the stair's marvelous repeated curves are visible from the courtyard.

Another type of dwelling arose in the Gothic years in France, during the period when merchant princes and private individuals built what we should call town houses and they called hôtels. One of the finest in Europe is the Hôtel Cluny

in Paris, now a museum. It was the town house of the abbots of Cluny, and stands as a fine specimen of late Gothic architecture in France. Other famous buildings are the Hôtel de Bourgthéroulde in Rouen, Hôtel de Sully in Paris, Hôtel de Sens, the House of Jacques Cœur in Bourges, the house of Agnes Sorel in Orléans.

To this period also belong the magnificent municipal halls that mark the rising of a city's wealth and strength. Among them are the hôtels de ville (town halls) of Arras, of Compiègne, Bourges, Dreux, St. Quentin. Then there are the Palais de Justice (Law Courts) of Rouen and Beauvais; beautiful monuments of a forgotten architecture like the Maison-Dieu, or Hôtel-Dieu (hospital), at Beaune. There have been many later municipal buildings set up, such as the Hôtel de Ville at Lyons, an ornate Renaissance structure, but nothing will ever bring back to France the beauty, the "otherworld" quality, of the Gothic domestic and municipal buildings.

The Renaissance was brought to Paris by the first king of a consolidated France, Francis I, who reigned from 1515 to 1547. He loved art and letters, had a brilliant court, and set an example to his courtiers in building and in cherishing beautiful things. Behind the king, influencing him, helping him, was that wonderful woman, his sister, Margaret of Navarre.

A great army of Italian artists and architects came and settled in Paris. The first mood of the Renaissance showed in the grafting of Italian details on the French Gothic. The severe classical lines of Italian Renaissance work were long in appearing—about a hundred years. The northern French clung to the pointed sky-line of the Gothic style they loved. As in Italy, the Renaissance came more fully to growth in the parts where Gothic architecture had never been deeply rooted; where the old Romanesque had lingered the Renaissance blossomed most freely.

The splendid monument to the enthusiasm of a king

The favorite home of Francis I was the Château of Fontainebleau, which he built just outside Paris. Here a kind of school of art and architecture gathered, with artists and architects like Primaticcio, Philibert de l'Orme, Jean Bullant and Pierre Lescot to the fore.

Yet Fontainebleau as a château is not nearly so fine as Blois or Chambord. Its interest lies more in the superb lay-out of the grounds, the formal gardens, terraces and lakes, and in the details of the buildings: the porticoes, staircases and marvelous internal decoration by artists like Benvenuto Cellini and Primaticcio. The château was originally designed by Gilles le Breton. Vignola and Serlio added extensions later which were admirable in themselves but marred the harmony of the whole.

The early French architecture of the Renaissance

The period of the Fontainebleau school marks the beginning of the real French architecture of the Renaissance, and also marks the end of the happy-go-lucky style of building which, adding line on line and stone on stone, had produced the medieval treasures of France.

The life and work of Philibert de l'Orme marks the cleavage between the old and the new. He was fully aware that the old genius of the master builders was gone; that the new style of buildings coming with the Renaissance needed another kind of knowledge, of technique. After De l'Orme, architects, as we understand them, working to plan, to measured drawings, became the builders of France.

It has been said that the art in which France has always rendered her most brilliant service to the world is the art of architecture. In the Palais du Louvre in Paris, known the world over now as "The Louvre," we can see the development of this art. The Palace, rebuilt on the site of an older palace, was begun in the reign of Francis I; it has been completed within the memory of your grandfathers. Thus some four hundred years have gone to the building and adorning of this pile, which is the masterpiece of Renaissance architecture in France.

The amazing house which was to cover forty-five acres

The Louvre, together with the Palace of the Tuileries, to which it was long intended that the Louvre should be joined by means of a gallery, made together a truly imposing royal residence, covering forty-five acres. Even without the Tuileries—which was destroyed in 1871 by the Paris Communists—the Louvre stands as a stupendous piece of architecture, with its various pavilions and its courts.

When Pierre Lescot began, at the

orders of Francis I, a new palace which should take the place of the Gothic Louvre of his forbears, he was doing more for the Paris of to-day than he could possibly know. His work was in the early Renaissance spirit and of beautiful dignity; the rest of the architects, who followed his lead, worked naturally according to the ideas of their own period, but seemed to agree to depart as little as possible from the ideals of Lescot. Jean Goujon, the sculptor, made the decorations for Lescot's façade; his labors and his genius are made forever memorable in "Jean Goujon's door." Catherine de Medici carried on Lescot's original idea, and planned along the Louvre the connecting gallery with the Tuileries, a scheme taken up about three hundred years later.

Henry IV set Du Cerceau, the architect, to work on the Louvre in the early years of the seventeenth century. Du Cerceau's work was largely lost in the alterations made by Napoleon III from 1860 to 1865. Next, Louis XIII and Cardinal Richelieu set to work, with Lemercier as architect, who began about 1625 the large court of the Louvre. His labors are best remembered by the Pavillon de l'Horloge in the middle of the west façade.

The next in this interesting procession of kings who loved building is Louis XIV, with Cardinal Mazarin and Colbert, the great minister. These first set Le Van to work about 1650 to finish the court Lemercier had begun, then ordered Claude Perrault, the court physician, to design the long eastern façade, 600 feet long. By this time the pure French early Renaissance spirit had been lost in a Slavish imitation of Italian architecture. Colbert and his master Louis XIV had called in all the Italian artists and architects they could. Bernini, who planned the great piazza of St. Peter's in Rome, was summoned to Paris to give designs for this very part that Perrault built.

Art swallowed up in flattery in the palace of versailles

Presently Louis XIV turned his attention to the building of Versailles, a pleasure palace where the glory and greatness of Louis could be extolled and his name carried down to farthest posterity. Versailles is, on the whole, a very uninspired building, whose chief architects, Le Van and Mansard, imitated the Italian Renaissance without succeeding in catching its greatness, and, absorbed in this imitation, forgot the excellent teachers they had in their own French Renaissance masters. The interior of Versailles was given up to mirroring the grandeur of Louis; art was swallowed up in flattery. Incredible sums of money were lavished on this palace.

The Petit Trianon, a country house for one of the court favorites, was set up at Versailles during the next reign, in a rather happier manner; this little palace becoming the favorite residence of the ill-fated Marie Antoinette.

From toward the end of the seventeenth century till after the Revolution little more was done to the unfinished Louvre. Napoleon I set Percier and Fontaine to work there. They planned and began the connection with the Tuileries which Catherine de Medici had wanted. Napoleon III carried on this idea, the work being in the hands of Lefuel and Visconti about 1850. These two built the "New Louvre"—the part close to the Tuileries. Lefuel was laboring at other parts of the great pile from 1860 to 1878. In the meantime the Palace of the Tuileries had been destroyed. The outer arm of the Louvre, which was to touch it, was therefore rendered somewhat meaningless. All that is left of the Tuileries is a piece of the façade, in the Tuileries garden.

The great domes which replaced gothic spires and towers

The Renaissance in France changed the face of the country as completely as Wren's churches changed the face of the city of London. Where the Gothic spires and towers had dominated the sky-line, presently rose up the huge domes that were the chief feature of the new sacred buildings. At first past and present were curiously mixed, as in the churches of St. Eustache and St. Etienne du Mont in Paris. They were built about 1532. It is very interesting to see these structures built on medieval lines, with flying buttresses and rounded apses, bearing the unmistakable stamp of the Renaissance in their decoration and wall treatment.

Lemercier, the architect of St. Eustache, also designed the Church of the Sorbonne, which was built about a hundred years later. It has the usual classic front and the dome of the Renaissance church. St.

THE NORTH FRONT OF THE CHATEAU OF PIERREFONDS, IN FRANCE

THE CHATEAU OF JOSSELIN, IN FRANCE, WITH ITS QUAINT DORMER WINDOWS

Sulpice, Val de Grâce, St. Paul, and St. Louis were built about the same time as the Sorbonne. Here, in the latter church, the Baroque style is creeping in, with its curves and florid ornamentation. The Church of the Val de Grâce was built by Mansard, St. Sulpice by Le Van, the two chief architects of Versailles. St. Sulpice is an immense church, with eighteen chapels. Its wonderful pillared façade was added by Servandoni.

Mansard also built the dome of the Church of the Invalides—one of the finest domes in Europe. In 1755 the Panthéon rose, as if to crown the labors of the Renaissance movement in France, but the dome is not so fine as that of the Invalides, built a hundred years earlier.

The classic revival in France follows the rococo style

With the decline of the Renaissance spirit in architecture France fell into the overdecorated Rococo style. But French taste would not long tolerate this, and there was a classic revival under Louis XV when Roman architecture was very closely followed. In the Panthéon, the greatest ecclesiastical monument of the time in France, exterior and interior are both classically treated. In shape a Greek cross, it has a dome 265 feet high and an imposing portico of colossal Corinthian columns. The Grand Théâtre at Bordeaux was another product of this movement.

Under Napoleon many buildings in the Roman style appear: the Arc de Triomphe du Carrousel behind the Tuileries, the Arc de l'Etoile in the Champs Elysées, and the Church of the Madeleine were all designed, by the emperor's wish, in a style as Roman as the needs of each would permit.

The Greek revival took little hold on France, and has but one notable monument, the Church of St. Vincent de Paul, by Hittorff.

A Gothic movement began about 1845 and, though it produced few notable buildings, was responsible for the restoration of medieval monuments like the Château de Pierrefonds, of which we have already spoken.

The reign of Napoleon III was a period of great activity, particularly in Paris, where the Louvre and the Tuileries were finished and the New Opera was constructed. This is by far the most sumptuous building for amusement in existence. To this reign belong also the Palais de l'Industrie, built for the exhibition of 1855, and several great railway stations (Gare du Nord, Gare de l'Est, and others). In these the modern French version of the Renaissance was applied skillfully to buildings made largely of iron and glass. Napoleon III also added splendid new avenues and squares to the city of Paris.

After the Franco-Prussian War a number of important structures were erected —not original in style but marked by refined taste and good planning.

The spread of the Renaissance into the smaller countries

The Renaissance found its way into the smaller countries of Europe, and while the marvels of the Louvre, and the Invalides, and châteaux like Chambord were rousing the enthusiasm of the French and being influenced by French art, a number of buildings were rising in the Low Countries of the Rhine lands and being equally influenced by the art already existing there. It seems natural that French Renaissance buildings should have their own distinction, due to the exquisite taste and refinement of the French peoples, and that the Belgian, Dutch and German Renaissance buildings should have their difference rather than distinction, due to the florid and less refined tastes of the peoples concerned. Dignified and restrained architecture of the Renaissance at its best, as in the Louvre, or parts of Greenwich Hospital, could have no hold in countries whose natural tastes led them to like more ornament, more twists and curves, and much decoration.

Persistent Gothic features in the Renaissance buildings of Germany

East of the French border the masterpiece of the Renaissance is Heidelberg Castle as shown in the parts built between 1531 and 1612. In spite of its period the castle is more Gothic and medieval in spirit than anything else. It is an interesting array of halls and wings grouped about an open space, with the great watchtower dominating the whole mass. It seems that the builders of the varying periods set up an even sky-line only under protest. They loved the broken-up Gothic shapes much more than a horizontal, classical contour.

How much the steep Gothic roofs were beloved in Germany we can see from

FORTRESS-PALACES AND LOIRE CHATEAU

The Escurial, the great palace and monastery near Madrid.

The famous spiral staircase at Blois.

An entrance to the Château of Blois.

The beautiful Cluny Museum in Paris.

The Palace of the Popes at Avignon.

their old houses in Nuremberg, and at Hildesheim, in Hanover. The builders clung to this style when the Renaissance was telling them to feel differently: hence buildings like the Rathaus in Altenburg, the Rathaus in Heilbronn, the Pellerhaus in Nuremberg, the Gewandhaus in Brunswick. The sixteenth-century Stuttgart Castle and the Zwinger Palace in Dresden, built in 1711, show a good deal of the picturesqueness of German Renaissance.

A number of public buildings, mainly town halls, were set up in this period in the Netherlands, and to many existing Gothic piles Renaissance additions were made, as in the town halls of Ghent, Delft and Haarlem. The charming little Town Hall of Ypres was shattered under the German guns in the World War, like so many other Belgian monuments of the Renaissance. The Hôtel de Ville in Antwerp is a sturdy, well-built pile with a façade over three hundred feet long and a richly decorated centre pavilion. The sixteenth-century Town Hall of Amsterdam is supposed to be the best in Holland.

THE NEW STYLE OF CHURCHES WHICH AROSE IN EUROPE

The guild houses of Brussels and Antwerp form another group of Renaissance buildings as interesting in character as in history. Other little monuments of this period which we should not forget are the Maison de l'Ancien Greffe, now part of the Law Courts of Bruges, and the Musée Plantin in Antwerp, which was built in 1550 for a merchant and later used as a printing works.

The Catholic reaction against the Reformation was responsible for a sudden zeal in church-building, led mainly by the Jesuits. The general spirit of the new erections was Baroque or Rococo, which, we remember, was the last exuberance of the Renaissance style. Europe was dotted with these new churches.

Several of them rose in the Catholic parts of Belgium in the seventeenth century. Protestant Holland and Germany would have little to do with them. St. Michel in Louvain is an example of this late Renaissance style. There are many such churches in Antwerp, Bruges, Namur and Brussels.

The churches that were erected in Germany during the sixteenth, seventeenth and eighteenth centuries are curious blends of all styles, Gothic and Renaissance and classical being sometimes mixed up in one church. Buildings like the Marienkirche in Wolfenbüttel, the church in Buckeburg, St. Michael in Munich, Salzburg Cathedral, and the Neumünster in Würzburg are interesting revelations of a peculiar taste, but they cannot be called great architecture: they are overdecorated, and lack dignity and restraint.

THE REMARKABLE BUILDING DESIGNED BY MICHELANGELO'S PUPIL

Baroque architecture was a little more at home in Spain than in Northwestern Europe, the country being already saturated with the rich extravagances of Moorish art. Both early and late Renaissance in that country produced interesting buildings of a free and fanciful type. Between these two periods was a spell when for about a hundred years architects who loved ancient Rome tried to graft a classical style on Spanish architecture. The most important architect of this middle period was Juan de Herrera, a pupil of Michelangelo.

Herrera was the chief designer of one of the most famous piles in the world—the Escurial, some thirty miles from Madrid. This group, begun in 1563, was not completed until nearly 150 years later. It includes monastery, college, church and palace. Philip II, for whom the Escurial was built, loved the great austere mass of yellowish gray granite, and inside its severe walls perhaps found peace.

Herrera allowed himself most wisely to be dictated to by the material he was using and by the site. These masses of granite rising up on the sun-bleached, lovely land must not be trimmed or decorated, must heave themselves up as if Nature had flung them there. Hence the remote, grand look of the Escurial seen for the first time from a distance, with its long unbroken walls and corner turrets, the high central dome and towers of the church. Herrera designed many other buildings, including the Casa Lonja in Seville and the unfinished Valladolid Cathedral. But nothing else in Spain shared the magnificent austerity, the sobriety, of the Escurial.

BEAUTIFUL STONEWORK THAT VIED WITH THE SILVERSMITH'S ART

Before and after the period that saw the Escurial built a great many rich and fantastic palaces and churches rose in

The beautiful Château of Versailles near Paris.

The Town Hall of Arras as it was before the World War.

The Rathaus, or Town Hall, at Altenburg, in Germany.

The Rathaus at Heilbronn, in Germany.

The Château of Chenonceaux, in France.

the peninsula. The earlier period is the more charming, where Moorish, Gothic and Renaissance styles mingle in any one of many buildings.

The kind of decoration achieved was so rich and fanciful and beautifully finished, and seemed so like a metal-beater's or silversmith's work, but in stone, that it was given the name Plateresque—from *platero*, "silversmith." This peculiar beauty can be seen in the Casa de Ayuntamiento in Seville, the Casa de la Conchas in Salamanca, the Casa de Miranda in Burgos.

During this time, the early sixteenth century, most interesting additions were made to the Alcazar at Toledo in the form of new façades to the old Moorish-Gothic granite castle. The best example of early Renaissance secular architecture in Spain is the palace of Charles V at Granada, built to adjoin the Moorish Alhambra. Here a square mass of building in golden-colored stone, inset with tinted marble, is set about an open circular court. Round the court runs a fine colonnade of Doric and Ionic columns.

Granada Cathedral is the finest religious expression of the Renaissance in southern Spain. It was begun by Diego de Siloë in 1529 in memory of the triumphs of Ferdinand and Isabella, and though unfinished, it is a most magnificent pile. St. Estéban, Salamanca, built about the same time, more in the Plateresque style, is a charming combination of Gothic, Moorish and Renaissance art. Jaen Cathedral and Malaga Cathedral belong to the same period and are very beautiful.

SPAIN AS THE HOME OF LOST CAUSES IN ART

Later on, in 1677, came Nuestra Señora del Pilar, Saragossa; and a hundred years later still, St. Francesco in Madrid, a domed church which was intended to be a great tomb-house of the famous men of Spain.

In her architecture of the varying periods Spain could not help enriching all that she borrowed from other countries. Her builders were peculiarly gifted in their ability to pile on ornament without making their architecture florid; to make innovations which are so successful that one wonders why they were not made elsewhere.

The truth probably is that, where all art is concerned, Spain is a land of genius. And at the same time, where architecture is in question, Spain may be called the home of lost causes. So much was triumphantly begun and never finished; so much has fallen into ruin and lies in ruins where it fell.

LIVERPOOL CATHEDRAL, BUILT BY SIR GILES GILBERT SCOTT

THE NEXT STORY OF THE FINE ARTS IS ON PAGE 6679.

The Rhine, with Cologne Cathedral, the architect of which is unknown.

LEGENDS AND TALES OF THE RHINE

CONTINUED FROM 6484

THERE are many rivers larger and longer than the Rhine, and perhaps some are more beautiful, but few have so many stories and legends connected with them. Every hill or mountain, cliff or castle, has its own particular story. Some of the stories are true, but often they are merely legends or tales that have been passed on from one generation to another.

Behind the town of Koenigswinter, on the right bank of the Rhine, a great spike of rock lifts upward to the sky. Crowning its highest point are the ruins of Castle Drachenfels. Drachenfels means "Dragon's Rock," and a very wonderful story tells how the name was given to the Castle. In the days when dragons lived and fought and were killed by brave and gallant knights, a great terror froze the hearts of all dwellers in the Rhine valley. For halfway up the rocky crag was a dark cavern known as the Dragon's Cave. And in this cave lived a hideous beast, half man and half snake. From its mouth flames shot out and scorched everything within reach. Smoke poured from its nostrils. Its claws and the scales on its skin rattled and clattered like a blacksmith's shop gone mad. When it moved the whole hillside shook as with an earthquake. And the river Rhine ran by as fast as it could, for it hated its waters to stay near such a monster. But the truly terrible thing the dragon did was to eat people. It ate boys and girls, or men and women. Age or youth made no difference. It wanted human flesh. The people around were heathens, and because they feared this monster they worshiped it and fed it with human bodies. To get a supply of food they crossed the Rhine and captured defenseless Christians who were peacefully plowing in the fields or working in their tiny homes. Two heathen princes, Ronsik and Horwald, took turns in capturing Christians and feeding them to the dragon. But one day among the captives the two princes saw a maiden so beautiful that they both fell in love with her at once. They quarreled furiously because each wanted the girl to be his wife. Out came their swords and the sharp blades went *clang! clang!* against each other. But neither prince could conquer. So they decided that perhaps the girl had better be given as a sacrifice to the dragon, and a day was appointed for the shameful ceremony. When the maiden was

told of the sad fate in store for her, she did not weep nor cry: she only prayed for strength to meet her end bravely.

The day came. Even the sky wept large tears as the helpless young girl was led to the Dragon's Rock. The Rhine roared past in sullen anger as the people of the neighborhood gathered around to await the dragon's appearance. Prince Ronsik's heart sank as he thought of the fate hanging over the maiden, and he determined to try to save her if he could. He drew his sword and rushed forward. With a noise like thunder the dragon darted out of its cave and opened its flaming jaws to swallow its prey. But the maiden did not blench. She held up her little crucifix and looked up to the heavens. Instantly the monster gave a fiendish yell and plunged into the river. At once the people who had seen the power of the Cross begged the girl to teach them Christianity. Among the first to be converted was Ronsik. Soon afterward he married the maiden and built for her a castle on the Dragon's Rock. The castle ever afterward bore the name of Castle Drachenfels.

This cave on Drachenfels has another story. Some people believe that the dragon which was killed by Siegfried lived in this rock. Lord Byron gives a beautiful description of Drachenfels and the country around it in the Third Canto of Childe Harold's pilgrimage. He says:

The castled crag of Drachenfels
Frowns o'er the wide and winding Rhine,
Whose breast of waters broadly swells
Between the banks which bear the vine,
And hills all rich with blossomed trees,
And fields which promise corn and wine,
And scattered cities crowning these,
Whose far white walls along them shine.

On the opposite bank of the Rhine are the remains of another castle, called the Jew's Castle. Above the ruins a large cross stands out. This is to commemorate the murder of a chief by his brother.

EBERNBERG

EBERNBERG means "castle of the wild pig," but when you learn the reason for this strange name, you will surely understand. On a steep cliff not far from Kreuznach there stands an immense castle. Many years ago, its count, upon awakening, found his castle surrounded by enemies. The count knew that they could not capture his home, because the surrounding moat, or deep ditch, was too steep and the walls were too thick and high. But they could prevent the people inside from procuring food.

The siege lasted for many days, and starvation for all was near. The count finally went into the stable and brought out a wild pig, which he had caught alive while hunting some weeks before. Taking the pig to the outer wall, he pinched and pricked the animal until it began to squeal. He did this every day until a week had gone by. The enemy, hearing the squealing every day, said: "We can never starve them out, they have too many pigs." Discouraged and disappointed, they went away. The wild pig had saved the castle.

RHEINSTEIN AND REICHENSTEIN

THE castles of Rheinstein and Reichenstein are situated very close to each other, and there is an interesting story connected with them.

Many years ago Rheinhard of Reichenstein was deeply in love with the beautiful Hinda of Rheinstein. Now Hinda's father was very wealthy, but Rheinhard had only a small castle and very little money. Nevertheless, he presented Hinda with a beautiful ruby, which had been in his family for many years. The maiden seemed very much pleased, and finally the young lord, unable to restrain himself, declared his love. Hinda promised to marry him.

According to the custom of the times, it was necessary for Rheinhard to send as an embassy to the castle of Rheinstein one of his most distinguished relatives. The only kinsman anywhere near was a wealthy treacherous old uncle, Ludovick by name. This false old man was delighted to go to the court of Hinda's father, but when he arrived there, instead of demanding Hinda's hand for his nephew, he declared his intention of marrying her himself. Hinda was in despair because she wanted to marry Rheinhard and hated the uncle. Her father, however, wanted her to marry Ludovick because he was powerful.

"I will marry no one but Rheinhard," Hinda declared. "You shall marry the man I choose for you, and you may as well make up your mind to that," answered her father, and considered the matter settled.

horse, and the nervous animal plunged forward. Away she rode, as fast as the horse could run, toward her lover's castle. Ludovick attempted to follow her. Just as Hinda's horse arrived at Reichenstein the old man's horse stumbled, and both

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Rheinstein is one of the best preserved of all the German castles, as well as being in one of the most picturesque locations. Below and to the right you can see the winding river at the foot of the steep cliff.

The next day was set for the wedding and the unhappy Hinda looked beautiful in spite of having spent a sleepless night. Seated on a spirited horse, she rode next to her father on her way to church. Just in front of that building she spurred her rider and charger fell over the precipice and were killed. Rheinhard was his uncle's heir and inherited all his money and became lord of his vassals. The lovers were married and, as far as we know, lived happily ever after.

THE BROWNIE AND THE FARMER

ON a cold day in midwinter a poor farmer was painfully making his way through the forest near Seegburg. The ground was slippery and almost impassable, and he had to stop very often to get his breath. It began to rain and his hands and face were red and cold. Hardly able to walk any farther, the man looked imploringly to the sky for help, but the sky did not aid him.

"Hello, old farmer," a voice suddenly called. He looked around, but could see no one.

"Here I am," was heard again, and behold, under a root, a brownie was crouched on a hazelnut. Can you imagine how small was this little man to be able to sit on a hazelnut? He was leaning his head on one hand and stroking his long gray beard with the other.

"Are you very cold?" the tiny voice asked again.

"Of course, since I am not sitting under a root, as you are."

"Your leathern breeches are too thin."

"They are too old."

"How old?"

"Oh! my grandfather left them to me, and I have not money enough to buy another pair."

"You poor man, I will give you a pair of my breeches," volunteered the little man. The farmer thought it was a great joke to think that he could wear the trousers, which apparently were not large enough to fit his finger. Nevertheless, to please the brownie he tried to put them on. Behold, they fitted him well.

"Thank you ever so much," said the farmer, and turned to depart.

"Wait!" shouted the brownie. "Where are you going?"

"I am going to the city to buy three pennies' worth of bread for my wife and seven children."

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Little is left of Castle Drachenfels, but there is enough to show how large and how strong it once was. It has been visited by thousands of tourists from all parts of the world. It is on the east bank of the river.

"Put your hand in your pocket and see how much money you have now." Astounded, the farmer pulled out six pennies.

"See," said the brownie, "your money will be doubled every time you count it, and you can soon become a rich man. Remember, never wear another pair of breeches, no matter how rich and powerful you may become." The farmer wanted to thank the brownie again, but the tiny creature had disappeared.

The man now began to count his money, and soon he had as much as he could carry. He hurried into town and bought bread, cake, meat and wine. Imagine the joy of the wife and the seven children. The farmer, industriously counting his gold, soon became the wealthiest man in the neighborhood. He built a magnificent palace and had a large storeroom filled with gold. Naturally enough, many of the dukes and kings who visited the palace wondered why the wealthy man wore such shabby leathern breeches.

Finally the rich man thought, "It is a shame for one so powerful to wear such breeches. I will have them washed and then perhaps they will look better." The washerwoman hung the breeches on a fence to dry and suddenly a strong blast of wind blew them away. This, of course, was the work of the brownie. The next day when the man counted his money he found the same amount as the day before. Alas! his money no longer was increased. But don't feel sorry, for he still had a great deal, and was in no danger of starving.

THE FOUNDING OF THE MAINZ

ON the left bank of the Rhine, almost opposite the place where the river Main empties into the larger stream, stands the town of Mainz. Of this town old people tell a curious tale. Long, long ago—some people say fourteen hundred years before Christ was born—Germany was a wild country covered with forests. The people were Celts, and at that time were very ignorant and superstitious. They believed in witches and magicians, and were in great fear of them. The Celtic town or village of greatest importance was Trier, on the banks of the Moselle River. In this town lived a very powerful magician named Reemug. Reemug was full of mischievous ideas and was always playing tricks on the townspeople. At last the townspeople became so annoyed that they decided to drive Reemug out of Trier. They all joined hands, and making a ring around the magician, pushed him out of the gate into the road. "Leave here at once and go to the place where the pepper plant grows," cried the mayor of Trier, as parting advice.

The magician trembled with anger and shook his fist at the townspeople. "Wait! You shall regret this. I shall build a city finer and more beautiful than Trier! Then you will be sorry for what you have done." Instead of going to Borneo, where the pepper plant grows, he went to the Rhine. By his magic a city sprang out of the earth. Reemug called this city Mainz. And to this day it is a larger city than Trier.

RHEINGRAFENSTEIN

THE castle of Rheingrafenstein is perched high on a huge rock, and there is a curious story connected with its erection. A powerful lord thought that the top of the rock would make a fine site for a castle, for, in case there should be war, the enemy would be unable to attack it. But he found it impossible to carry to the top of the cliff the stones necessary for the building of such a castle.

One day as the lord was in the depths of despair, the Evil One appeared and said that the castle could be built overnight if the lord would give him the first living creature who should look from its windows. The nobleman agreed, and the next morning a beautiful strong castle stood on the heights. The lord was afraid to enter the palace, but his wife was clever. Riding ahead on a donkey, she bade all follow her into the castle. When she came within the gates, she tied a cat on the donkey and drove the beast through the door. It went to a window and looked out. The Devil seized his prey, and flew into a terrible rage when he found it was a donkey. He dropped the animal on the rocks below, and vanished from the district, never to return.

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THE EARLY HOME OF JOHN HOWARD PAYNE

This is the childhood home of John Howard Payne, who wrote Home, Sweet Home, a song which has touched the hearts of thousands. Such songs as this have an influence that no one can estimate. Probably this was the home to which the heart of the writer turned with so much affection. It still stands in the town of Easthampton, Long Island, not far from New York City.

Old-fashioned people said "the kitchen is the heart of the home." In days when life was simpler, much time was spent in the kitchen, which was usually a large bright room where the cooking and the spinning and other household tasks were done. This picture shows the great fireplace of the kitchen of John Howard Payne's home.

Upper picture, copyright by Brown Bros.

WHAT THIS STORY TELLS US

MANY songs are written, but few live, and those that do are remembered because they express some of the deepest feelings of the human heart. When a writer gives us a song that does this, a song in which the whole nation perhaps can sing of its love of home and country, he has woven one of the cords that bind the nation together. The songs that can truly be called national have something of greatness in them, and the story of their writers is worthy to be held in our remembrance. This story tells us about some of the writers of famous American songs and the times and places when the songs were written.

SONG-WRITERS OF THE UNITED STATES

CONTINUED FROM 6408

SONG-writers were not welcomed in the early days of New England. The singing of songs was frowned upon by the stern Puritan forefathers as an ungodly practice, and it was not until the eighteenth century that they tolerated anything except the Psalms of David in the churches.

There were no choirs in those days. The clerk or precentor, or sometimes the minister himself, gave out the tune and the psalm. He then "lined out" the psalm; that is, he read it out line by line, while the congregation sang it after him. Probably the younger members of the congregation found this practice just as boring as we should. After a time the people protested that as there were now plenty of books in the colony, and the majority of the congregation could read just as well as the minister and clerk, they saw no reason for continuing it. The clerks and the older members of the congregation clung fast to the old custom. The younger members persisted, and there was as much turmoil in the churches as there was at a later day, when it was first proposed by some of the Scotch Presbyterians to use organs.

The first book made on the American continent was a psalm book—The Whole Book of Psalms Faithfully Translated into English Metre—which was printed at Cambridge, Massachusetts, by Stephen Daye, in 1640, and was commonly called the Bay Psalm Book. Even outside of New England the first settlers could scarcely be called a singing people, and those who did sing, sang the songs that came from England. The isolated mountaineer in the southern states continues to sing these songs down to our own time. A valuable collection of old English songs and ballads, sung as their ancestors learned them in the time of the Stuarts, has been obtained from the singing of these mountaineers.

Where there was little singing there was no encouragement to write songs, and we find no famous song-writers until after the Revolution. Interest in singing was aroused, however, at the end of the eighteenth century by a man named William Billings, a tanner who lived in Boston. He was an uncouth little man, lame and half blind; but he burned with a pure flame of enthusiasm which no amount of ridicule could quench. He was very nearly self-taught, and it is said that he wrote his first compositions on the walls of the tannery and on sides of leather. He wrote The Singing Master's Assistant and The Psalm Singer's Amusement. It is said that he introduced the pitch pipe, so that precentors could give accurately the note on which to commence an unaccompanied tune, and that he also introduced the use of the cello to lead the singing in churches.

At about the same time the singing schools, which the grandfathers and

grandmothers of the present day knew so well, appeared here and there. Since then there has been no lack of interest in singing.

American poets and composers have shown remarkable aptitude for creating popular songs. They have brought together words and music which the public have welcomed and sung with delight, because they expressed what was in the hearts of all men and women. More than once their songs have touched the hearts of other nations, too, and have gained a world-wide popularity. Although some critics have called them crude, some of the greatest composers in the world have recognized genius in their very simplicity.

Music has been called "not food for the soul, but wine." A stirring song lifts the spirits of those most exhausted and depressed, and helps them to fresh courage. Some years ago, when need arose for more overseers of the laborers on the Panama Canal, overseers who could sing and influence the men to sing while at work were given the preference. It had been found that the cheering influence of singing kept the men from homesickness and helped them to do better work.

However beautiful they may be, songs that deal with peculiar or individual experiences instead of with those which everybody knows and shares, never stir great enthusiasm. To be popular a song must draw people together with a sense of brotherhood. It must express some universal feeling simply and directly.

Why the Concord Hymn did not become popular

The Concord Hymn, by Ralph Waldo Emerson, sung at the completion of the monument erected at Concord on the anniversary of the battle of Lexington, is a beautiful poem; but because it is the work of a man somewhat withdrawn from the mass of his fellow-men it lacks universal feeling. Its patriotic theme and its literary beauty have not been enough to make it popular.

A sentiment which comes to everybody as he grows older is love of what has been familiar in childhood. The first successful American songs were mostly of this character. One such is The Old Oaken Bucket, written in the summer of 1817 by Samuel Woodworth, the son of plain people, and a man of little education, but of strong, true feeling. Songs such as his, and Roll On, Silver Moon, by Joseph Turner, of Charlestown, Massachusetts, who set his words to an English tune, are what most appealed to the popular fancy before the crisis of war aroused demand for music impelling more stirring emotion.

Songs of sentiment and home

Of all the songs inspired by love of home, Home, Sweet Home, has been the most enduringly popular. Like many another favorite, it was written for the stage. Its author, John Howard Payne, was living at that time in Paris. He had been sent there by an English theatrical company to find and adapt French plays and operas for the English stage. One opera which he thus made over, and in fact largely composed, was Clari, the Maid of Milan, and for its homesick heroine he wrote his famous song. He himself was lonely and homesick for his native America, and the words express his mood of love and longing—the mood of all exiles from what is dearest and most familiar. The music was adapted by Henry Bishop, from an old air. But for this song John Howard Payne would now be forgotten. Yet in his own day he was a celebrity for other achievements, and he became one very young.

He was born in New York on June 9, 1791, of fine old New England stock. Most of his childhood was spent in Easthampton, Long Island, where the home he immortalized may still be seen. He was an uncommonly handsome and gifted boy, with a strong desire to go on the stage. Without his family's knowing it, the young stage-lover started and conducted a little theatrical paper called The Thespian. The New York Evening Post decided to reprint one of The Thespian's articles, and this led to the acquaintance between young Payne and Mr. Coleman, editor of the Post. Mr. Coleman was astonished to find the able writer a lad of only fifteen. He became interested in him, and with another gentleman raised funds to send him to Union College, Schenectady, New York.

Payne still desired to go on the stage, and finally money troubles caused his father to consent. For a few years the youth had a brilliant success as an actor, both here and in England. Then, strangely enough, his talent flagged and changed. Some power went out of him

that never returned. He finally withdrew from the stage and supported himself by writing, adapting, translating and working in other sorts of stagecraft.

Like many another man of talent, he was lacking in practical sense. No matter how much money he was making, he never managed to save for the future; he never could be thrifty. He was in money difficulties when, through the influence of friends, he was appointed United States consul at Tunis, where he died in 1852.

The world went on singing Home, Sweet Home, and those who had known its author felt that at least he was entitled to a grave in his native land. Thirty-one years after his death Mr. W. W. Corcoran had the poet's body brought from Tunis to Washington, D. C. The President, his Cabinet and a body of soldiers escorted it to Oak Hill Cemetery, where it was laid to rest.

NEGRO MELODIES—A DISTINCTIVE FORM OF AMERICAN SONG

The American song-writers have the distinction of being the creators of a unique form of popular song, the so-called negro melodies, though not written by negroes. That these have a singular charm has been acknowledged the world over. Sometimes plaintive, sometimes rollicking, they are characterized by simple, tender and appealing melody. Most of them appeared originally in minstrel shows, a form of entertainment altogether American and for many years immensely popular, both before and after the Civil War. They were a curious mixture of buffoonery, local and contemporary jokes, and these delightful songs.

Many of the best known—Way Down upon de Suwanee Ribber, Old Uncle Ned, My Old Kentucky Home, Old Black Joe, Old Dog Tray, and many others—about 160 in all—were written by a Northern man, Stephen Collins Foster, of Pittsburgh. It is sad that a man whose genius has for so long been a source of good and pleasure should himself have been unhappy and unfortunate. His career was wrecked by intemperance. His life began in a most promising way, for he was the youngest and well-beloved son of cultivated, well-to-do people.

He was born on July 4, 1826, to the strains of The Star-Spangled Banner, which was being played on his father's lawn by a Pittsburgh band. Stephen had every advantage of education. From a little child he was a musical prodigy, and composed songs. His first published song, Open Thy Lattice, appeared when he was sixteen. From that time he became increasingly popular. His songs earned a great deal of money, but it was for other people. Stephen remained poor. Two songs, Oh, Susanna, and Uncle Ned, he gave to a friend, who made $10,000 out of them.

The Christy Minstrels had a great reputation in his day, and nearly all Foster's songs were written for them. Old Folks at Home has proved the most lastingly popular. It has been translated into many languages, and is known and loved the world over. The pathos of its words has expressed the longing for friends of many a homesick heart.

Foster died in New York at the age of thirty-eight as the result of an accident. The body was carried to Pittsburgh and buried beside his parents.

A NORTHERN WRITER WHO WON SOUTHERN FAME

Another songster who won love and fame but not money was Daniel Decatur Emmett. He wrote many popular songs. One is very famous—Dixie. He was a well-known minstrel himself, a clever actor and singer, loved as "Old Dan Emmett" by his comrades on the stage. In spite of his great popularity he is said to have earned only about $600 in all as a song-writer. Like Foster, he began to write when he was very young. Old Dan Tucker appeared when he was fifteen.

He was a Northern man, in sympathy with the Union cause, which makes it an odd fact that he should have written Dixie, the great war song of the Confederacy. He wrote it in 1859 for the well-known Bryant's Minstrels, of which show he was then a member. "I wish I was in Dixie" was a much-used phrase with show people forced to travel in the chilly North in the winter instead of in the balmy South. It occurred to Emmett on the blustering autumn day when he had set himself to write a new song for his show. He was in New York, and there Dixie was first sung. A year and a half later it was introduced into the opera Pocahontas, and was first sung in the South at the Pontchartrain Theatre in New Orleans. A company of Zouaves marched on the stage singing it, were received with great enthusiasm, and it immediately became popular throughout the

South, the favorite tune of the Confederate army.

Many years later when Mr. Emmett visited the South, as the author of Dixie, he received an ovation everywhere. The friendly old man enjoyed the attentions heaped upon him, but soon had had enough and was glad to return to his little home at Mount Vernon, Ohio. There in a plain cottage, busy with his chickens and his garden, he lived very simply and contentedly until his death, in 1904, at the age of eighty-nine.

YANKEE DOODLE, THE MOST POPULAR DITTY

Nobody knows just how or why Yankee Doodle became the national ditty. We know that the poverty-stricken, ill-equipped soldiers cheered their spirits by singing it during the weary marches of the American Revolution. The story goes that a certain Dr. Schuckburg, an army surgeon, is responsible for introducing to the army as a famous military air of England what was really an ancient nursery rhyme. His joke was more successful than he could have foreseen. It found favor with the ragged regiments. The rollicking verse joined to the melody suited the rough-and-ready spirits of the rank and file.

The tune has won high favor from no less an authority than the famous pianist Paderewski, and from Rubenstein, too, who played it with variations while in America. Many different words have been set to it. After the original doggerel the most noteworthy version is perhaps The Battle of the Kegs, written by Francis Hopkinson, father of the Hopkinson who wrote Columbia. This poem commemorates a well-known incident of the Revolution, an attempt by David Bushnell of Connecticut to blow up the British fleet at the mouth of the Connecticut River by floating kegs of powder down on them. The attempt failed through the premature explosion of one keg.

From time to time more dignified words have been written to the tune of Yankee Doodle, but none have succeeded in replacing the first doggerel in popularity. Yankee Doodle as we know it has been aptly called the "national Mother Goose, the nursery rhyme of the American Army."

THE STAR-SPANGLED BANNER, AND HOW IT WAS WRITTEN

A sentiment which we all share is love of country. Naturally this stirs us most in periods of national stress and struggle. When war clutches the land the singers have always burst forth in patriotic song. All war songs have come from the hearts of their writers. When Francis Scott Key, then a handsome and clever young lawyer, wrote The Star-Spangled Banner, he could not have foreseen that it would become the national anthem of his country, and that every night when the flag is lowered at sunset at every fort, and on every flagship of the navy, it would be played by the military bands.

All night Mr. Key had listened to the bombardment of Fort McHenry, near Baltimore. If the fort fell, he knew that Admiral Cockburn, commander of the British squadron, would proceed to attack Baltimore. The day before, Mr. Key, in an American vessel which the Government had placed at his disposal, had visited the British flagship to obtain the release of a friend who was prisoner of war. This was granted, but the two, with one other American, were detained on their vessel for fear that, if allowed to land, they would reveal the British plans. While daylight lasted the anxious Americans watched the flag. When dawn revealed it still floating above the fort they knew the attack had not succeeded. Then, in his joy of relief, Key drew an old letter from his pocket and on its back wrote the first stanza of The Star-Spangled Banner. He finished the poem later in the day, when his vessel had been allowed to land.

It was first printed as a hand-bill inclosed in a fancy border. One of Key's friends, Judge Nicholson, of Baltimore, saw that the tune of Anacreon in Heaven, an old English drinking song, fitted the words, and the two were quickly united with astonishing success. Military bands seized upon the new hymn and it was played upon every occasion. From that day to this its popularity has never flagged, in spite of the fact that it is rather difficult for the ordinary voice. The old flag which prompted the poem, much torn by shot and shell, much cut down from its original size, still exists. It was stoutly made to withstand time by Mrs. Mary Pickersgill.

HAIL, COLUMBIA!, RECEIVED WITH ENTHUSIASM

Like so many popular songs, Hail, Columbia! was written for the stage. It was first sung at an actor's benefit in Philadelphia in 1798. Gilbert Fox, for whom

the benefit was given, anxious to have the occasion a success, asked a clever friend, a young lawyer named Joseph Hopkinson, to write a patriotic song. Mr. Hopkinson wrote the poem and set it to the tune of the President's March. The tune, which greatly helped the popularity of the song, is said to have been composed by a Philadelphia musician of German descent named Roth. It was received with great favor, the big audience joining in the singing. People flocked to hear it.

This popular melody is said to have had a helpful influence on public affairs. There was at the time some danger that the United States might interfere in difficulties then increasing between France and England. Hail, Columbia! awakened home pride and patriotism, and a feeling that the young nation had problems enough without interfering with those of other nations. Philadelphia was then the national capital, and learning of the stirring new song, President Adams and his entire Cabinet went to the theatre to hear it.

My Country, 'Tis of Thee, and the Man Who Wrote It

America, so well known and loved by American school children, was written in February, 1832, by Samuel Francis Smith, a graduate of Harvard College and at the time a student in the Theological Seminary at Andover, Massachusetts. The young man was a passionate lover of music. He was twenty-three when he was given a collection of songs in which the music of the British national anthem was included. He was so impressed by the dignity of the tune and its rhythm that he set to work to compose words to it that would be suitable for the circumstances of his own country. The result was My Country, 'Tis of Thee, and no other hymn has been found to take its place in the affections of the whole people. Though he lived to be eighty-seven and wrote other hymns and songs, he never equaled its great success. It is said that it took him only half an hour to pen the words so familiar to us all.

Many legends have sprung up about one of the most familiar songs—John Brown's Body. We know that the tune belonged originally to an old camp-meeting hymn. Some investigators claim that the John Brown meant was an ungainly Scotch soldier whom his comrades loved to tease. His regiment, the Twelfth Massachusetts Infantry, was the first to sing the song of which there have been many variations. The soldiers and the public in general have always loved it and have refused to substitute finer words or poetry for the cruder doggerel. William Steffe, writer of many much-loved hymns, is said to have composed the music.

The Battle Hymn of the Republic

Mrs. Julia Ward Howe's great Battle Hymn of the Republic was originally intended to supply nobler words to the John Brown tune. She wrote it at the request of James Freeman Clarke, who went with her and others to visit an army post near Washington. She heard tired soldiers singing John Brown's Body as they returned from a skirmish, and while the wounded were being carried to their pallets the stirring strains took possession of her and kindled her ready patriotism to lofty expression. A woman of genius, fine character and high ideals for her country, she put her best of heart and mind in her great poem. The Battle Hymn of the Republic ranks as the finest song of the Civil War.

Marching through Georgia, and Other War Songs

Marching through Georgia is one of the greatest war songs. The man who wrote it, Henry Clay Work, had very little technical education in music. In his patriotism he found inspiration for the stirring words and music which many a time were to cheer and help along weary, footsore soldiers. Oddly enough, General Sherman, the leader of that famous march, is said to have always felt a great dislike for the song.

Another war song, so beloved and stimulating that it was often ordered sung just before the men went into battle, was Tramp, Tramp, Tramp, the Boys are Marching, and the stirring song The Battle Cry of Freedom. Unlike Work, the author, George F. Root, was a student and a teacher of music, and in his day was one of the first authorities in musical matters in the United States.

An ardent young Southerner, James Ryder Randall, impatient that his native state should delay in joining the Confederacy, wrote Maryland, My Maryland, considered one of the finest war songs and the best-beloved by Southern people. He wrote it at a single sitting in the dead of an April night in 1861, in New Orleans,

where he was then employed on a newspaper. The words, published in The New Orleans Delta, were received with great favor and were very soon set to music. A young lady, Miss Jennie Cary, of Baltimore, had the honor of establishing My Maryland as an army song. She set it to a German melody and sang it on the occasion of a serenade given her sister at Fairfax Court House, Virginia, by a body of General Beauregard's troops. Another well-loved song of the Southern Confederacy was The Bonnie Blue Flag. There is some doubt whether it was written by Henry McCarthy, author of other songs, or by Annie C. Ketcham, of Kentucky. We know that it was first sung at the Varieties Theatre in New Orleans in 1861.

Tenting on the Old Camp Ground was another of the songs that might be called inspired, because both words and music were written in a few minutes by Walter Kittredge while he was preparing to go to the front in 1862. Kittredge, born in New Hampshire in 1834, was the tenth child in a family of eleven. His father was a farmer and could not afford to send the boy to a music teacher, although Walter showed a strong love for music. However, Walter picked up some knowledge of the rudiments of music, and at the age of eighteen he began to give ballad concerts. When he was drafted in 1862 the words and music of his famous war song came to him as if by magic. At first he could not find a publisher for it, but later he made it popular by singing it himself. Soon it swept the country, and it is one of the songs which still holds people.

Gay songs of the Spanish-American war

The Spanish-American War left two songs which struck responsive chords in people's hearts. The gay lilting tune and merry words of A Hot Time in the Old Town To-night, by a man named Joe Haydon, were on every lip. There is a story that the American soldiers fought their way to victory at San Juan Hill to the rollicking tune. The Spaniards in Cuba were convinced that this was the American national anthem. The witchery of the air still remains, and the song is in great demand when people need cheering. The other song still remembered and played as a welcoming song was When Johnny Comes Marching Home. This song was written by Patrick Sarsfield Gilmore, born in Ireland in 1829. Gilmore, when a man grown, came to the United States. He wrote When Johnny Comes Marching Home as a Civil War song, but it was revived in 1898, six years after Gilmore's death, and gained its great popularity then. It was the song that was used to welcome home Colonel Roosevelt. Among the popular songs of the Spanish War period remembered vividly by many people are: Goodbye, Dolly Grey, Just Break the News to Mother, and On the Banks of the Wabash, Far Away.

Song-singing by soldiers is recognized as of so much importance that when the armies were in training for the World War, conductors were sent to every camp to teach the men to sing together. Many good songs were written specially for the soldiers.

An old song which was revived

The public had to some extent forgotten a song once very popular, Ben Bolt, when the great success of Du Maurier's story Trilby, both as novel and play, in which this song was introduced, brought it back to favor. The author was Dr. Thomas Dunn English, a physician, and a reserved and scholarly man. He wrote his one famous song by request as a poem for The New York Mirror, and was considered sufficiently paid by the honor of having it printed. The words appeared in 1843. It was quickly perceived that they were well adapted to singing, and various tunes were tried. The first was discarded. Another, composed by Dr. English, was not successful. Finally a German melody, with some adaptations, was found to fit the words, and the new song became widely popular in America and England.

College songs and college singing

The college song, whatever its rollicking form, is apt to have something of academic flavor. Notably so is the case of one of the most famous—Fair Harvard—written by Samuel Gilman. He was an alumnus of the great university of which he sang. He was born in Gloucester, Massachusetts, in 1791, and was a Unitarian clergyman. He was forty-six years old, living in Charleston, South Carolina, when he wrote the song.

College singing helps greatly in fostering the community feeling, which is one of the best things in college life. No

celebration in a college is complete without singing, and many a desperate game has been won on the enthusiasm created by the singing of the students on the benches round the field. What football-player on the Yale team does not remember how his tired muscles responded to the reproachful singing of Boola-boola? What Princeton man can forget the fresh courage that he gained when the strains of Old Nassau thundered across the field? Many of the most popular college songs, however, take much of their interest from the music to which they are set, and the verses themselves are of little worth. The college songbooks contain many songs common to most of the colleges, but each college has its distinctive songs. Most of these were written by students who wrote only for love of their college, and sometimes even the name of the writer is unknown. In most cases the song was written in praise of some particular college, and its fame rarely spread beyond the college alumni.

Songs of the Cowboys on Western Plains

Anyone who has lived in the ranching section of the United States will know some cowboy songs. These songs are real American folk-songs, springing spontaneously from the hearts and lips of men and women engaged in an occupation typically American—cattle-herding. On the great ranches of the prairies and in the foothills of the West there is still a certain degree of isolation from the rest of the world. A cowboy who is "riding herd," that is, guarding a bunch of cattle, may sleep under the stars with his saddle for a pillow and with no other human being within scores of miles. When he cooks his frugal meals over a tiny camp-fire, or when he is "rounding up" a stray steer, the cowboy sings. He sings of frontier days on the prairie, of the Apaches, of Geronimo, of buffaloes and long-horns, of mule-skinners and bucking bronchos, of cattle stampeding, of the round-up, the long-trail drive or the night watch. Cattle, horses, saddles, ropes or "reatas," chaps and slickers, and coyotes, are the subjects of his verses.

Many of the songs have been handed down from cowboy to cowboy by word of mouth, and their authors have been forgotten. The airs were familiar, catchy ones easy to sing. Other songs were verses clipped from magazines or newspapers and adapted to a certain tune by a musical cowboy. The words were often changed beyond recognition.

These songs may not have the finish of European ballads, the product of many centuries of minstrelsy, but they represent a tradition in the making. They have their roots in the wild old frontier days when bold men were winning an empire, and they are still the songs of the hardy men from Texas to Montana. Fortunately N. Howard Thorp, known as "Jack" Thorp, has collected many of the most familiar songs and published them under the title Songs of the Cowboys. Mr. Thorp, a cowboy-poet, was an old-time cattleman and cowpuncher in the Southwest. Texas, Arizona, New Mexico, Colorado, Utah and Indian Territory, now Oklahoma, knew him as a sweet singer and as a daring man. In his collection are many songs written by himself and taken into the cowboy's repertoire. In cases where the author is unknown Mr. Thorp gives the name of the place where he first heard it and also the name of the cowboy who sang it. Get Along, Little Doggies, The Cowboy's Lament, The Dying Cowboy, The Cowboy's Dream are among the songs that every cowboy knows.

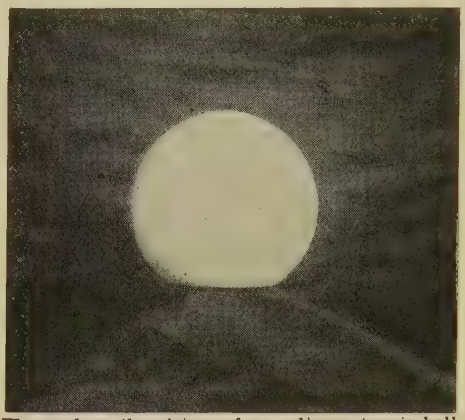
The Beauty of Negro Spirituals

No account of songs and song-writers in America is complete without some mention of the negro "spirituals," the recollection of which is kept alive by the students at Fisk University, Hampton and Tuskegee. The words of the spiritual songs, in which the negro slaves of the plantations poured out their hearts, are rough and crude, but they are full of intense pathos and feeling. The tunes to which they were set are all in minor keys, and when sung in the open air by soft negro voices, such songs as Swing Low, Sweet Chariot; Oh! Dem Golden Slippers; and a number of others, produce a wonderful effect. They were first introduced to the world by the "jubilee singers" of Fisk University, to which institution many of the negro race owe a good education.

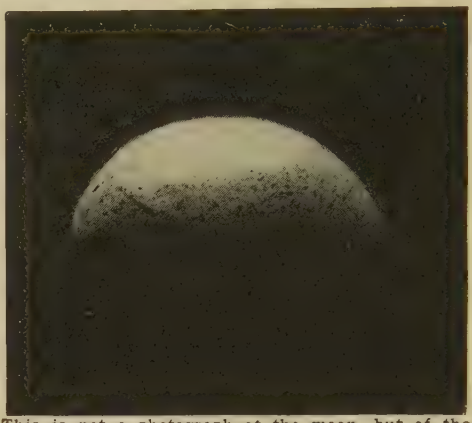
The United States is proud of her hymn-writers, who were able to voice the religious longings and consolations of which all the world knows something. We tell of some of these writers of hymns in the chapter beginning on page 4435.

THE NEXT STORY OF MEN AND WOMEN IS ON PAGE 6631.

MOUNTAINS AND THE MOON ON A TABLE



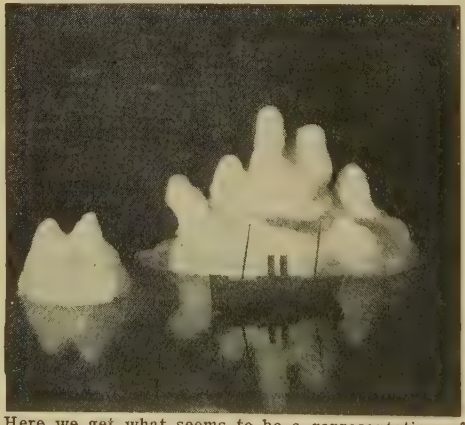
We see here the picture of an ordinary tennis ball. By arranging the lighting of this object in a certain way, a clever photographer gets a remarkable result.



This is not a photograph of the moon, but of the tennis ball in the first picture. This striking effect is obtained by light falling only on top of the ball.

From ordinary table-salt we can build a fine range of mountains, as seen in this picture. When photographed, these will look exactly like a real range of snow-covered mountains.

No man has climbed to the top of these mountains. If we attempted to set foot upon them, we should crush them; they are made of salt piled on a dining-table, and cleverly lighted.



Here we get what seems to be a representation of the huge icebergs that Shackleton met with on his Polar expedition. As a matter of fact, the picture shows candle-grease on glass with a paper boat.

The Alpine scene in this picture is built up of coal and alum upon a dining-room table. The little chalets, or cottages, are those tiny toy houses that we sometimes see displayed for sale in the shops.

PHOTOGRAPHY ON A TABLE

CONTINUED FROM 6302

WE have heard it said that the "camera cannot lie"; but nowadays this saying is hardly true. It may have been true years ago, when very little was known about photography, but it is really quite easy now to make cameras tell very big stories indeed. By carefully choosing and arranging a few quite ordinary articles, some very curious or beautiful pictures may be obtained, so that we can never feel quite sure that the photograph we are looking at is really what it seems to be. The pictures on page 6516 are none of them what they appear to be; they are made up, or faked, and a brief description of the way in which they were obtained will enable any boy who possesses a camera to arrange similar scenes for himself.

Table-top photography is very interesting, and provides plenty of employment and amusement during the winter and on dull, wet days, as bright sunshine is not necessary to obtain good results. The idea is to obtain negatives of mimic landscapes which have been built up from anything that seems suitable. Very few preparations are necessary. The scenes must be arranged upon a steady platform, such as a table or an upturned box. The background is merely a good-sized piece of cardboard propped up by means of a few heavy weights. Upon this background paper of different tints may be pinned, or we may attach masses of wadding to imitate the sky and clouds.

It is just as well to have two screens, which may be set up on one side or on both sides of the stage for the purpose of shutting out the light—a strong top light often being better than any other. Any odd piece of stout card or thin board will serve the purpose. The camera should be set up opposite the stage, and should be furnished with a lens of fairly wide angle.

Very few people looking at the picture of what appears to be a new moon would imagine that they were only gazing at the photograph of part of a tennis ball. Yet that is really all it is. In order to photograph the real moon very costly apparatus would be necessary, and only men who have had a great deal of experience in photography would be able to do it; but a very good imitation may be obtained at little or no cost.

The photograph should be taken at night, as the room must be quite dark. We must use a black cloth for a background, draping one end of it over a small box, and place a white tennis ball on the top of this, as we see in the first picture on page 6516. We ask someone to hold a light close to the ball while we are focusing, to enable us to get the rim of the "moon" quite "sharp." When all is ready we blow out the light, take the cap off the lens, and burn a strip of magnesium wire, holding it in such a way that the full light falls upon one side of the tennis ball. The resulting picture will be very puzzling to those who are not in the secret.

A photograph of real lightning, too, would be difficult to obtain, but we may get a very good imitation of this by means of a sheet of smoked glass. We smoke the glass by passing it rapidly over the flame of an oil-lamp, taking care not to hold the glass too near the flame, or it will crack. Then we mark the track of the lightning upon the smoked surface with the point of a sharp pencil, copying, if we like, a genuine photograph of sheet or forked lightning. We prop up the sheet of glass with the help of some boxes so that a light held behind it will shine through the scratches. A lighted candle must be placed behind the glass in order to focus, and when our preparations are complete we make the exposure by burning a strip of magnesium.

wire, or a little magnesium powder, in the place where the candle stood. If we stand the glass upon a piece of looking-glass, a good reflection, as though in the waters of a sea or lake, may be obtained.

To make a scene like the second picture in the centre of page 6516, we drape a gray cloth to make a "cloudy" background and pile up a quantity of powdered salt or alum or sugar to form peaks and ridges, as in the first picture in the centre of page 6516. We focus so as to take in only the summits, and make the exposure as before by burning magnesium wire, taking care that the strong light falls well from one side. The result will be a very pretty picture of sunrise on the mountains.

The dangerous-looking icebergs in the first picture at the bottom of page 6516 are really nothing more than harmless little pieces of candle-wax. We soften the wax by gently warming it, press it into shape, and stand it upon a sheet of looking-glass. A little ship, cut out in dead-black paper and placed so that it rides above the reflection of the bergs, will add greatly to the general effect.

It is surprising how many things may be made to do duty in table-top photography. Carefully selected pieces of coal may be piled up to form mountains. Powdered salt, or alum, makes very good imitation snow. A moss-covered twig is an excellent tree. Little china figures or small dolls will take the place of people. Water may be imitated by a looking-glass, or, better still, by a black cloth covered with a sheet of ordinary glass, for a less brilliant and more natural reflection is obtained in this manner.

Little figures cut out of black paper may be used in all sorts of ways. Models, too, are very handy. In the last picture the house is a little model chalet from Switzerland, set up on a coal "mountain," well sprinkled with alum "snow." An almost endless variety of pictures may be obtained by pressing toy trains, carts, or dolls' houses into service, and, working on these lines, an ingenious boy will soon have a number of interesting pictures which will well repay him for the pains he has taken in obtaining them. These "photographic illusions" will puzzle many of his friends.

THE GAME OF MAKING RHYMES

A VERY good pastime for boys and girls, and for grown-ups, too, when stormy weather keeps them within doors, is to make up two-line rhymes, each taking it in turn to give to the others the word they are to use at the end of the first line, and for which they must find another rhyming word at the end of the second line. It is easy to make up a two-line rhyme, if the word given has many other words rhyming with it. For instance, with the word *then* some such couplet as this may be made:

A little nonsense now and then
Is relished by the wisest men.

The great idea in this game of making rhymes, however, is, when our turn to give a word comes, to pick one that has no rhyme.

There are many such words in the English language, and here are some of them: Alb, breadth, bulb, chimney, coif, depth, doth, eighth, fifth, film, fugue, gulf, hemp, lounge, mouth, mourned, ninth, oblige, orange, of, pint, polka, pork, porringer, prestige, puss, sauce, scarf, silver, sixth, spoil, sylph, tenth, twelfth, plagued, warmth, wasp, wharves, widow, width, window, with, wolf, wolves.

When it is someone else's turn to give a word to which we must find a rhyme, and the word given is like one of these, it is worth knowing that the difficulty may sometimes be overcome by ingenuity. For instance, *orange* and *month* have been used in this way:

From the Indus to the Blorenge
Came the rajah in a month,
Eating now and then an orange,
Conning all the day his Grunth.

The Blorenge is a hill near Abergavenny, and the Grunth is the sacred book of the Sikhs. Here are two other attempts with *month.*

"You can't," says Tom to lisping Will,
"Find any rhyme for month."
"A great mithtake," was Will's reply;
"I'll find a rhyme at wunth."

How many weeks in a month?
Four, as the swift moon runn'th.

Another rhyme to *orange* is the following:

I gave my darling child a lemon,
That lately grew its fragrant stem on;
And next, to give her pleasure more range,
I offered her a juicy orange.
And nuts, she cracked them in a door-hinge.

Porringer is a difficult word to rhyme, but the difficulty has been met in these ways:

The second James a daughter had,
Too fine to lick a porringer;
He sought her out a noble lad,
And gave the Prince of Orange her.

When the nations doubt our power to fight,
We smile at every foreign jeer,
And with untroubled appetite
Still empty plate and porringer.

Portugal is not an easy word, but:

There was a young lady of Portugal
Whose turn was decidedly nautical!

A rhyme can sometimes be made by splitting a word at the end of a line, as in the following example, which gives a rhyme to *polka:*

Our Christmas tree produced a doll ca-
Parisoned to dance a polka.

Window and *widow* have been rhymed.

Bold Robin Hood that archer good,
Shot down fat buck and thin doe,
Rough storms withstood in thick greenwood,
Nor cared for door or window.

Since of this suit I now am rid oh!
Ne'er again I'll lodge with a widow.

When difficult words are given for rhyming, it always causes surprise and adds greatly to the interest of the pastime if we can overcome the difficulty in some ingenious way like those given.

BLINDFOLD GAMES FOR BOYS AND GIRLS

BUFF WITH A WAND

ONE of the players, called Buff, is blindfolded, and stands with a cane in his hand in a circle made by the rest of the players. The players dance round him while someone plays a quick tune on the piano, but they all stop if the music suddenly ceases, and Buff points with his wand toward anyone in the circle. The player toward whom he points takes hold of the end of the wand, while Buff gives a cry in imitation of the voice of some animal or bird. The person holding the wand answers in the same manner, and if, by the sound, Buff can guess who the player is, they change places. If he fails, the music starts afresh, the players dance round, and he must try again to guess right.

BLIND MAN'S STAB

THE players stand at one end of the room. On the open floor, a few paces away, seven or eight pieces of paper about the size of postcards are scattered. On each of these slips of paper some number is written. One of the players is then blindfolded, and taking a stick, sharpened to a point at one end, makes three strides toward the pieces of paper.

Then he stabs at them with his stick, doing his best to pierce those scraps which he knows have the highest numbers on them. Three thrusts are allowed, after which he is led back to the starting-point. If his aims were straight the numbers on the pieces of paper that he hit are reckoned to him. Another player then takes his place, and when each has had a turn, the one with the highest record to his name wins. Those stand the best chance who remember, after being blindfolded, where lie the papers with the highest numbers on them.

JINGLING

IN this game every player except one is blindfolded. The one who can see carries a small bell, and moving about among the rest, jingles it every now and then, slipping away before he can be caught. It often happens that the players in their efforts to grab the jingler, catch one another, and are not convinced of their mistake until they hear the bell again in a distant part of the room. This game is great fun if not played roughly and allowed to become too boisterous.

SPOONS

THE blind man is given two large spoons, and, when all the guests are seated in different parts of the room, he feels his way about until he discovers one of them. Then, with the two spoons, he feels them gently all over, to see if he can tell who it is he has found. Not a word must be spoken, not a sound must be made. If his guess is correct he hands the spoons to his captive, who is blindfolded in turn. The rest of the players should all change places as soon as the new "spoons" is blindfolded, and should do it quietly, so as not to disclose where they are sitting, and thus avoid getting named.

DRAWING A PIG

EVEN those who think themselves clever artists will be humbled when they play this game. Each member of the party has a piece of paper and a pencil. At a word given by the leader, each one must close his eyes and draw on the slip of paper the outline of a pig, not forgetting to put in the eye. No one must look at what he has done until the leader gives permission. The result of drawing a pig in this manner is always surprising. A prize may be given for the best drawing.

PUTTING ON THE DONKEY'S TAIL

FROM a large sheet of brown paper we cut out the figure of a donkey, but without any tail. We fasten the donkey up against the wall or on a screen. Then we cut out the tail, and pass a pin through that end of it which should be attached to the body. Each player in turn takes the tail in his hand, and he walks up to the paper figure on the wall with both eyes tightly shut, and tries to pin it in the position it ought to occupy. The poor donkey will seldom get his tail put on properly, and the mistakes made are very funny. The winner is the player who puts the tail on nearest to its proper place.

THE BLIND MAN'S BREAKFAST

BEFORE starting this game we ought to spread large sheets of paper on the floor. This being done, two players are blindfolded and seated opposite to each other, just within arm's reach. Then each is given a slice of bread and butter, or a cup of bread-and-milk and a spoon, and they proceed to feed each other as best they can. Their clothes should be well protected, for the spoons generally go anywhere but into their mouths. The blind man's breakfast is one of the funniest meals in the world.

BLIND PARTNERS

THIS is a game for four players, two of whom are to be blindfolded. Those who can see take one of the blindfolded as a partner, and all sit down, each at one side of a square table—the blind opposite the blind, with their partners to the right hand. A pack of cards is then scattered freely over the table and, when ready, the blind players are told to supply their partners with "bricks" for building. They at once set about finding the cards, but to do this only one hand may be used, and they must on no account leave their seats.

The builders, however, may direct them by word of mouth, though by no other means, and while bricks are plentiful, things go fairly well. When they become scarce, excitement begins. The hands of the blind men fly over the table; their partners call out directions as fast as they can, only to see the brick they want carried off by the enemy. Sometimes a card is brushed from the table and time is lost before it can be found; but it must be found. The pair who has the highest castle, or the most bricks, when all the cards have been used up, wins the game.

MAKING ANAGRAMS AS A PASTIME

MOST of us know that an anagram is a rearrangement of the letters of a word or phrase to form a new word or phrase that has some sort of connection with the old. Literally the word anagram means "letters backward," and originally an anagram was a word or phrase written backward, as, for example, *evil*, which is the anagram of *live*. But now the name anagram refers to a transposition of the letters in any order, so long as they form a new word or phrase.

HOW TO MAKE ANAGRAMS

A great deal of amusement may be had in a quiet way at a party, or where a few friends have met, by arranging an anagram game. Some words and phrases are selected and written on slips of paper, and these are then shuffled or shaken up in a hat, and the members of the party then take them in turn until all have an equal number of slips. Then so many minutes are allowed, and when time is called the competitors must stop, and each reads out his original words or sentences and then his anagrams.

A perfect anagram is the result of transposing the letters of a word or phrase in such a way that a new word or phrase is produced without the addition of other letters, and without the omission of any.

Playing at anagrams is not merely an interesting and amusing way of spending an evening. It is a useful, intellectual exercise, and does much to help one in thinking, and in the use of words. It is a pastime that has not been despised by the greatest, and many well-known anagrams are on record that were made up by distinguished scholars and writers.

SCRIPTURE ANAGRAMS

At one time, indeed, anagram-making was a serious study, and the Jewish Rabbis and the schoolmen of the Middle Ages believed that great truths could be discovered from the anagrams upon the words and phrases of Scripture.

A famous Latin anagram is upon Pilate's question: *Quid est veritas?*—"What is truth?" the letters of which rearranged give the sentence: "Est vir qui adest"—"It is the man before you." To those who have never tried, it may seem a very simple work to make an anagram, but they should attempt one, and they would find it needs skill and patience. On the other hand, some may think that it would be nearly impossible to transpose a dozen letters to form a word or phrase. When we understand, however, that twelve letters can be arranged in no fewer than 729,000,000 different ways, we see that there are, in the rearrangements, endless possibilities of forming new words.

THE KIND OF WORDS TO CHOOSE

In selecting words for anagrams, it is well to take long words with several vowels in them, as these offer greater facilities for anagrams than short words with few vowels. The kind of words that are suitable are the following: *Revolution*, which gives "love to ruin"; *astronomers*, from which we get "moon-starers"; *crinoline*, that gives "inner coil"; *French Revolution*, that can be transposed into "Violence run forth." *Impatient* gives "Tim in a pet"; from *radical reform* we get "rare mad frolic." *Old England* can be turned into "golden land," and *Paradise Lost* into "reap sad toils." *Surgeon* is a short word, but from it we have the anagram "Go, nurse!" *Telegraphs* can be transposed into "great helps," and *universal suffrage* into "guess a fearful ruin"—the *v* in this case being used for a *u*. *Punishment* will give "nine thumps," and *penitentiary*, "Nay, I repent it."

ANAGRAMS FROM NAMES

For a variation, the names of the persons present or of well-known men may be selected, and anagrams made from these. From *Disraeli*, for instance, can be obtained the anagram "I lead, sir!" but those opposed to this statesman's policy made their anagram upon his name "idle airs."

After the result of the general election of 1880 a political opponent turned *The Earl of Beaconsfield* into "Self-fooled, can he bear it?" *Charles Dickens* gives "Cheer sick lands," and *Douglas Jerrold*, "Sure, a droll dog." Two good anagrams from *Horatio Nelson* are "So! nation'l hero" and "Honor est a Nilo"—"His honor is from the Nile." From *Lord Palmerston* we get "So droll, pert man"; and from *Florence Nightingale*, "Flit on, cheering angel." Another good anagram on *Florence Nightingale* is "Cling on, feeling heart." *William Ewart Gladstone* has provided several excellent anagrams, such as the following: "A man to wield great wills"; "Go, administrate law well"; "G, a weird man we all list to"; "I'll waste no glad war-tune."

Or, for a further change, the names of places, flowers or birds, or, in fact, any class of words may be taken.

WORDS FOR ANAGRAMS

Here are some single words from which good anagrams can be made: Catalogues, Christianity, Crocodile, Lawyers, Melodrama, Midshipman, Parishioners, Presbyterian, Soldiers.

The following words have the article before them, and thus, of course, must be used in the anagram: The calceolaria, The nightingale, The turtle-dove. Here are two phrases for making into anagrams: Is pity love? Poor house.

The following names of well-known people also provide good scope for anagrams: John Abernethy, Thomas Carlyle, Charles James Stuart, Henry Wadsworth Longfellow, Alfred Tennyson—poet laureate, Sir Robert Peel, William Shakespeare, Robert Southey, George Thompson. In case any of us find difficulty in forming anagrams from these words and phrases, the solutions to all of them are given on page 6643.

There are two kinds of anagrams which furnish lots of fun, but they are more difficult to work out than the ones given already. One kind is called a palindrome, and it is a word or sentence which may be read backward as well as forward. Examples of words are "noon" and "tot" and of sentences "Madam, I'm Adam." The hardest kind of anagram is called a logogram, and it is made by using synonyms of the original word.

THE PUZZLES OF THE WIZARD KING

Here are a number of problems and puzzles of various kinds. The explanation of the puzzles that are given here, and of those that will appear in future pages of the Wizard King, is as follows: In a *hidden-word* puzzle the name is made up of the parts of two or more words. Example: "When ill *I lie so* comfortably in this cool, pleasant room!" The letters in italics show hidden flowers, lilies. In a *double acrostic* we write down under one another the names of the different things mentioned, and the initial letters read down from top to bottom, and the final letters read in the same way give the names of the persons or things we have to discover. In a *single acrostic* only the initial letters spell anything. In a *square word* the words forming the square read the same downward and across. *Beheaded names* almost explain themselves. "Tears, ears," is an example. In a *riddle-me-ree* my first, second, and so on, are letters. A *charade* is similar to a riddle-me-ree, only in this case my first, second, and so on, are parts of a word, not merely letters. For example: My first is a professor, *don;* my second opens a door *key;* my whole is an animal, *donkey. Transformations* and *anagrams* are almost the same thing. An anagram is the rearrangement of the letters of a word or words to form a new word or words which have some relation to the old ones. The following is an example of *quaint arithmetic:* What number from which one is taken is even? S-even. The solutions of the puzzles will be found on page 6641.

1. THE UNKNOWN QUOTATION

ONE day there came to the palace of one of the Eastern princes a poor man who was very fond of poetry. He had with him a sheet of parchment, and on it was the curious diagram shown here. The parchment had been sold to him by an old bookseller, who told him the following particulars about it:

"At each point in the diagram, or wheel, where lines cross, you must place a letter. When the proper 25 letters have been placed, the spokes will read as follows, beginning in each instance with the same letter at the centre. 1. A Greek letter. 2. A short poem. 3. A bird of Egypt. 4. A metal. 5. An image. 6. A goddess of the ancient Egyptians. 7. A flower. 8. Is never found where there is no water.

"Around the tire is a quotation from an English poet, with his name. The middle circle is a sentence encouraging you to solve the problem. The innermost circle is another sentence of further encouragement."

The prince, who, as it so happened, knew most of the world's poets off by heart, solved the problem, and sent the poor man on his way rejoicing. What was the solution?

2. THE MYSTERIOUS INSCRIPTION

The following is the translation of an Arabic inscription discovered in the temple of Persepolis. It can be read in such a way as to form four moral and useful maxims.

say	know	says	knows	says	knows
spend	have	spends	has	spends	has
tell	hear	tells	hears	tells	hears
covet	see	covets	sees	wants	sees

Do not	all you	for he who	all he	often	more than he

3. HIDDEN FISH

Be calmer, O aching heart! I have seen dogs push a door open. Let's have a good frolic, O do, dear father! Our teacher rings the bell five minutes too soon. Decatur bothered the Algerines more than once. Place the crowbar below the log in order to raise it.

4. SQUARE WORD

Without sight; enamored; white and hard and polished; a delicate fibre in the system; one who dries anything.

5. RIDDLE IN RHYME

I am, as you'll agree with me,
The funniest thing in land or sea.
My mouth is bigger than my head,
I always stay within my bed.
Yet, funnier still, I often rise.
Now answer *that,* you solvers wise!
Yet though in bed I always stop,
You'll see me racing neck and crop
Through the valley, down the hill;
In fact, I'm very rarely still.
This condition answer me,
This funniest thing in land or sea.

6. DOUBLE CHARADE

Two riddles at once are by me now rehearsed;
The first of my first yields the first of my second;
'Twixt the next of my second and next of my first,
There's often a miss—so sages have reckoned.
Of my first and my second the wholes may be seen
Uncommonly common on a common, I ween.

7. ROB ROY'S PROBLEM

Many of us have read the fascinating story of Rob Roy, by Sir Walter Scott. Rob Roy's real name was Robert Macgregor; and during his leisure moments, when he was not fighting, he was very fond of inventing puzzles. The printed signature below shows one of his little problems.

Rob Roy wrote beneath his own original little sketch:

"Start at any point you like and trace my name, as it is given above, without removing the pen from the paper, crossing a line, or going over any of the lines twice."

How is Rob Roy's problem solved?

8. MISSING LETTERS

B-t-e-n-h-d-r-a-d-h-d-y-i-h-,
W-e-t-e-i-h-i-b-g-n-i-g-o-o-e-,
C-m-s-p-u-e-n-h-d-y'-o-c-p-t-o-s,
T-a-i-k-o-n-s-h-c-i-d-e-'s-o-r.

9. BEHEADED NAME

Autumn o'er the earth has strewed
Me far and wide;
Everywhere my form is viewed,
Sere, and dried.
Now behead, I then pertain
To all house-tops;
Oft the welcome, welcome rain,
From me drops.
Behead again, the nuns at prayer
Us oft repeat.
Transpose—from woe and care
Relief entreat.

10. THE SQUIRREL AND THE CORN

A box has nine ears of corn in it. A squirrel removes three ears a day, and takes nine days to carry all out. Explain this.

11. THE WIZARD'S ALPHABET

Which letter is a measure?
Which is an industrious insect?
Which letter is a drink?
Which one is an exclamation?
Which is a river in Scotland?
Which is a bird?
Which is a vegetable?
Which is everlasting?

12. ANAGRAMS FROM SHAKESPEARE

(a) Scour in a dust-tin.
(b) Alike, a slim, raw sheep.
(c) Close ruin.
(d) Tap oracle.
(e) Free such lost dogs.
(f) Fan on hot jug.
(g) Scour a lion.
(h) A charmed one.

THINGS TO DO ON HALLOWE'EN

DUCKING FOR APPLES

GET ready two tubs, each half filled with water, one for the boys, one for the girls. Put in each a number of apples with long stems, each stem having a name very securely attached to it on a slip of paper. The fun consists in trying to catch one of the bobbing apples with the teeth; the apple must not be caught by the stem. The name attached to the apple is supposed to be the name of the future helpmeet of the youth or maiden who contrives to fish it out of the water. The hands must be fastened behind the back for this trick.

BURNING NUTS

Name two nuts and place them on a shovel held over an open fire—a gas log will do. Repeat this charm:

Nuts I place upon the fire,
And to each nut I give a sweetheart's name.

If either of the nuts hisses or steams, it shows that the owner of the name has a cranky temper. If the nuts pop together, and toward each other, the friendship between the two persons will probably increase and grow warmer. If, however, one does not pop at all, or they fall away from each other, the feeling will grow cooler and the friends will be divided.

APPLE-AND-CANDLE TRICK

Hang by a stout cord, attached to a hook in the ceiling, a short stick—about 18 inches long. The stick must be fastened so that it will balance horizontally. At one end of the stick fasten a short piece of lighted candle; at the other fix an apple. Set the stick revolving rapidly, and let the players try to snatch the apple from it with their teeth.

APPLE PARING

Peel an apple without breaking the skin, swing the paring round your head three times and let it fall to the floor over the left shoulder. The letter formed as it falls to the floor will give the initial of your future spouse.

COMBING HAIR BEFORE MIRROR

Comb your hair at midnight, standing alone before a mirror lighted by a candle. If a face appears in the glass looking over your shoulder, it will be that of your future partner.

WINNOWING GRAIN

Steal out into the garden or barn alone near midnight and go three times through the motion of throwing grain against the wind. The third time your future spouse will appear in some mysterious way, or you may gain some intimation of his or her station in life.

PROPHECY BY FEATHERS

Take three small, fluffy feathers. On three small pieces of paper write the words "blond," "brunette," and "medium," and attach these pieces of paper to the ends of the little quills. To make the test hold up the feathers by their tops, and with a puff of breath send them flying toward the table. The one that falls nearest to you tells the complexion of your true love. The test should be made three times to make the prophecy quite sure.

GHOST WRITING

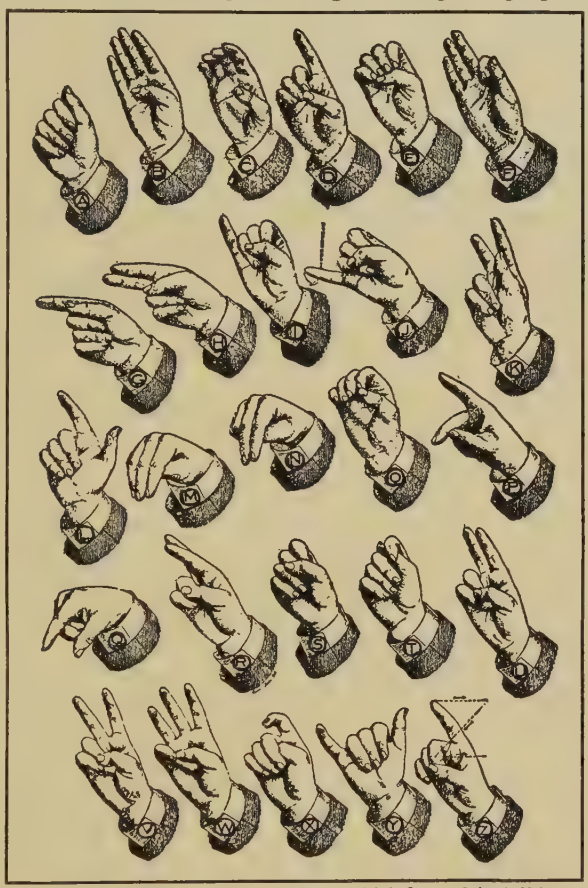
With a perfectly new pen dipped in pure lemon juice write a number of charms or prophecies on small pieces of paper and let them dry. The writing will disappear. Fold the slips of paper and place them in a basket, from which each player draws one. When the pieces of paper are held over the flame of a lamp or candle, the heat causes the writing to reappear and the prophecy can be read. This trick may be made quite mystical by appropriate ceremonies, such as reading the prophecies in a room dimly lighted by a small colored lamp over which the slips must be held. One person should read the slips one by one, and can add to the effect by reading very slowly and solemnly. The reader may be one of the players who has slipped out and assumed a long cloak, witch's hat and a small black velvet mask.

HOW TO TALK TO THE DEAF-AND-DUMB

THE scientific method of educating the deaf-and dumb, or, as they are more accurately called, deaf-mutes, is by word of mouth. They are taught to watch the lips of the person speaking to them, and from the movements of the mouth to understand what he is saying. It is amazing with what skill a well-trained deaf-mute is able to follow a conversation in this way.

The older method of communicating with persons who are deaf was by speaking with the hands, and as there are still many thousands of deaf-mutes who know of no other method of carrying on a conversation, it will be well if every boy and girl learns the deaf-and-dumb alphabet, as it is called, so that, should the necessity arise, he or she will not be cut off from all communication with the deaf person.

The complete alphabet is given on this page, and can be easily learned from the pictures. In talking to a deaf-mute the words are spelled out, and it might seem that this would be a very tedious and lengthy process. As a matter of fact, it is astonishing with what rapidity a conversation can be carried on when those using the sign language are skillful and well practiced in the art.



The alphabet, formed by the hands, which is used in talking to deaf-mutes.

One may sometimes see at a place of worship a little group of deaf-mutes seated in a corner of the church, with an interpreter giving in the finger language the substance, at any rate, of the sermon. Of course those who talk much with deaf-mutes in this way soon acquire a large number of signs to express well-known words or thoughts without spelling them. For instance, holding up the right thumb means good, and the right little finger signifies bad. To point upward means God or heaven, and there are many others. Numbers up to about twenty are denoted by holding up the necessary number of fingers, and larger numbers are usually spelled out in full.

It may seem that carrying on a conversation by means of the fingers would be a slow business, but deaf-and-dumb people who are expert can spell 130 words a minute. People who are accustomed to reading the finger language have no difficulty in understanding a conversation carried on with such rapidity. There is a two-handed alphabet used by deaf people in some countries, especially in Great Britain and Australia. The one-handed alphabet is used generally in America.

GAMES FOR BOYS

SHOULDER SHOVE

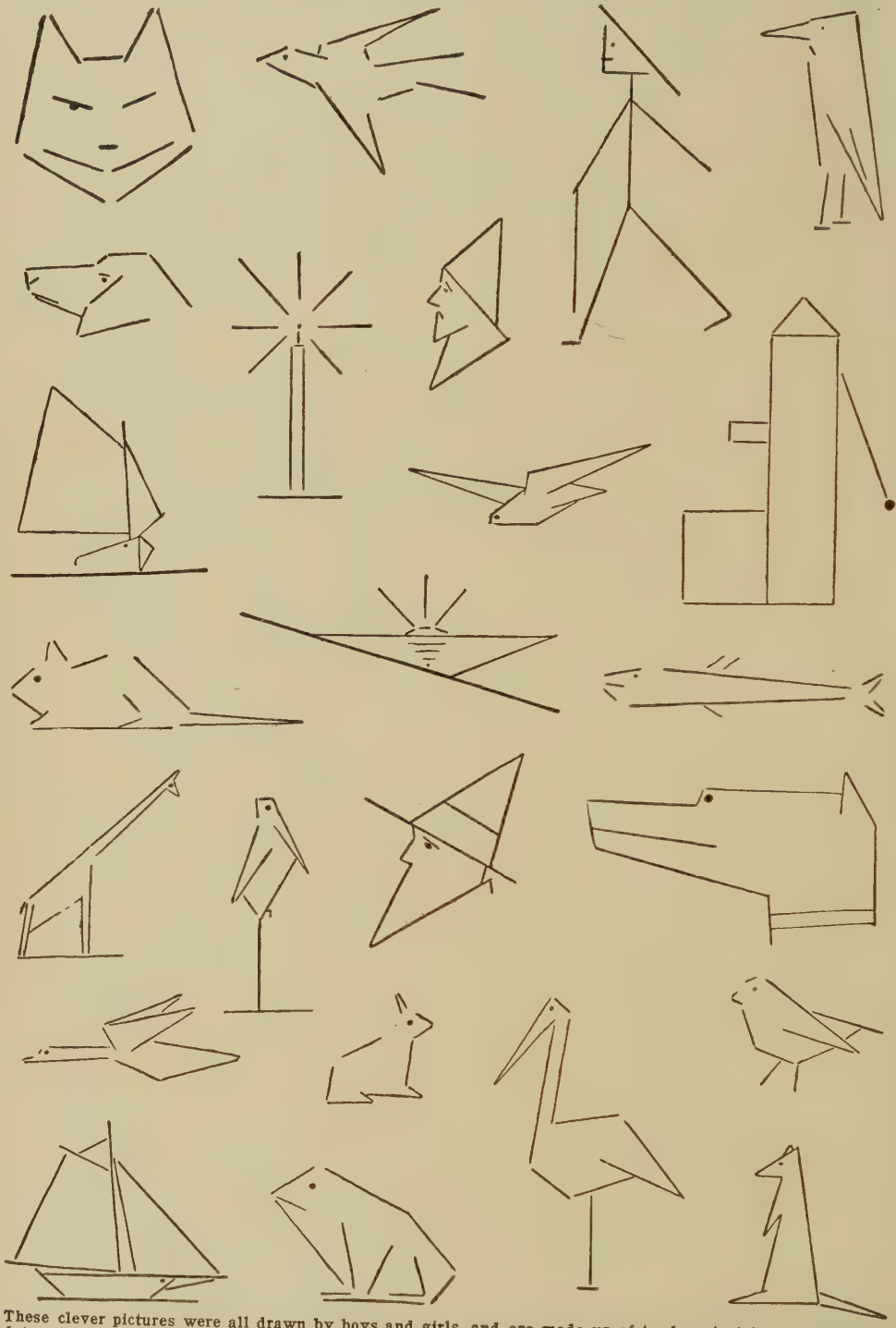
THIS is played by a group of four players, who stand in a circle about eight feet in diameter, and a fifth player who stands in the centre. The four in the circle fold their arms across the chest, and hop on only one foot. The fifth one, who is "It," may stand on both feet and is privileged to use both his arms. The object of the game is for the four players using only their shoulders to push the fifth out of the circle. He may avoid them by dodging or running. If he is thrust out of the circle, the four hoppers are considered to have won. If one of the hoppers places both feet on the floor or unfolds his arms, he must leave the circle.

ROOSTER FIGHT

THIS is a very old game and is played by two contestants, who stand within a ring about six feet in diameter. Each boy reaches down and grasps his own ankles. Holding this position, the boys try to use their shoulders to thrust each other out of the circle. The player wins who first succeeds in overthrowing the other, or in causing him to lose his grasp on his ankles.

THE NEXT THINGS TO MAKE AND TO DO ARE ON PAGE 6637.

A PICTURE WITH TWELVE LINES AND A DOT



These clever pictures were all drawn by boys and girls, and are made up of twelve straight lines and one dot, neither more nor less. It is more difficult to draw anything if we are confined to a few lines than if we put in many. Let us see if we can make drawings with twelve lines and a dot as good as these.

This picture of Summer by E. A. Harnel is the property of the Walker Art Gallery.

BUTTERFLIES AND MOTHS

CONTINUED FROM 6424

HUMAN genius has never invented anything lovelier than a butterfly, nor anything so wonderful. In the lore and legend of the ancients, in the fairy tales beloved of us all, nothing excels the surprise, the startling succession from repulsiveness to dainty charm, of this creature's strange career.

It is a delightful fact that any child may observe for itself the entire amazing life-cycle of these little wonder people of the gardens and the wilds. He can see it all, beginning with the tiny egg. He can feed the caterpillar which results, guard the chrysalis into which the grub passes, and finally he can see the covering break. Out comes a winged thing of the air, lovely as a floating flower, scented like one—the perfect butterfly.

Men who have studied the subject all their lives have sought to classify the eggs, in the hope of recognizing species by them, but the attempt fails. Take the eggs from their natural surroundings and mix them with others, and they are hopeless as a guide. And the difficulties go deeper than that. There are times when, in the presence of the perfect insect, we are puzzled to say why one is a butterfly and another a moth. It is simple enough to distinguish between a clothes-moth and a cabbage-haunting butterfly; but there are features in which moths so closely approach the butterflies as to make it a delicate matter to define the border line. As a matter of fact, the border line is much less sharply drawn by Nature than by entomologists. We who have followed this study have seen how one form emerges in another. And so it is here again. There are definite formulas to guide us, but there are many exceptions to remind us how difficult it is to draw sharp lines between the two kinds of our present group.

First, then, a butterfly flies by day, a moth by night. That holds good to this extent, that butterflies never fly by night; but, as against that, there are many moths which fly by day. Indeed in warm latitudes, where bats and other night-flying enemies of insects abound, moths which fly in the hours of darkness are rarities.

Another rule is that butterflies have their antennæ thickened at the ends, after the manner of little clubs, while moths have their antennæ fringed or feathered. But we look at a Burnet moth to find thickened antennæ-ends

here, and are reminded again that our law is not without exceptions.

Rule number three is that the butterfly when at rest raises its wings over its back so that they are at an angle of 90 degrees to the body; whereas the moth reposes with its wings down, like the roof of a house, with the rear wings hooked to the front pair. Yet some kinds of Skipper butterflies when resting flatten out their wings moth-wise, though they are free of the hook-and-eye attachments.

A LITTLE STRANGER THAT WAS WORTH ITS WEIGHT IN DIAMONDS

We do not know all there is to be learned. There is always the possibility of fresh discoveries even in lands where many students have been observing butterflies and moths for many years. During 1924 a professor in Manchester University reported the presence in numbers of unique moths which had established a fine family in the hollow of a tree on Kersal Moor, near Manchester, in England.

In no respect more wonderful than any other moth, this little stranger was deemed worth more than its weight in diamonds from the fact that it had never before been seen alive in England. If we but knew how the family of moths came to so unlikely a place, we should have a new chapter to add to the fascinating story of the migration of these frail insects.

The question of these migrations is extremely mystifying. Regularly whole swarms of certain butterflies leave the continent of Europe and fly to the British Isles and even farther. Sometimes only a few arrive. Some of the migrating species are: the Clouded Yellow, the Pale Clouded Yellow butterflies, the lovely Painted Lady, the Red Admiral; sometimes, too, though more rarely, the precious Black-veined White, the Bath White, the Camberwell Beauty, and the Long-tailed and Short-tailed Blues.

THE MYSTERY OF THE PAINTED LADY'S YEARLY FLIGHT OVERSEA

Darwin saw clouds of butterflies streaming out to sea from South America; more recently they have been seen bravely flying twelve hundred miles from the nearest possible land, Africa. Midsummer madness or the might of an overwhelming air current must be responsible for such great flights as these, but the regular occurrence of flocks of butterflies in England from the Continent makes us wonder whether they come by accident or design.

In America the Monarch apparently follows the birds south in the autumn and returns in the spring.

The unexpected coming of these fair visitors from afar does not exhaust the perplexities of distribution. We find just as much food for wonder in the goings and comings of other species. Which is the more thrilling, the finding of rare moths in a tree hollow on a Manchester moor or the amazing story of the moths of a coal-mine?

EXQUISITE GEMS OF BEAUTY FROM NATURE'S MATCHLESS STORE

Here we have no rare moth, but common examples of the Noctuids, as strangely housed as those frogs, toads and birds which have been found of late in the working of gold-mines in South Africa. Presumably noctuid eggs or caterpillars must have been carried down into this coal-mine on fodder bought for the mine ponies. For there are the moths and their young, breeding in rapidly succeeding generations. The caterpillars feed on the horses' fodder; the moths mature, fly in the darkness, and lay more eggs where the caterpillars may profitably pass their youth and make their wondrous change.

The way in which moths and butterflies hide their eggs must often bring about remarkable changes of habitat in this way. There is also a twin mystery of a different order attaching to the question. It should be advantageous for the eggs to lie snug and unobserved by creatures to which an insect egg is a dainty. Yet eggs of the moth and butterfly are among the most exquisite gems of beauty; lustrous as pearls, daintier than hand-wrought jewels. They are fluted, ribbed, patterned in a score of different ways—perfect as works of art, yet contrived with marvelous skill for the admission of the substance which renders them fertile. The material of which they are made also affords the larvæ their first meal from the shells when hatching has taken place.

Such beauty as this, we might think, would but render the eggs conspicuous, and so expose them to danger; there is safety in obscurity. But the plan succeeds, and the charm of form, texture and coloration must be accepted as an-

other item of evidence that Nature has, throughout her scheme, the desire for beauty.

The second element of mystery as to the eggs is how the parents know where to lay them. Any boy or girl collector knows where to look for the eggs or larvæ of the species. They know what to expect from the dead nettle, from the privet, from the linden, from the cabbage, from the oak and the apple, because moths and butterflies are true to their habitat.

A WONDERFUL THING IN THE LIFE OF A CATERPILLAR

The perfect insect goes back to the foliage or tree-trunk on which it was nurtured in an earlier form of existence. This is wonderful. No moth or butterfly eats. At most they drink the nectar of sugary flowers, or, as in the case of the Red Admiral, sip the juices of decaying flesh or the fluid of a puddle. But solid food has no meaning for them. They have no mouth parts for such food; some cannot even take moisture.

Yet all lay their eggs on a substance which will be cradle and larder to the caterpillars into which those eggs will turn. Their progeny will inherit the riches in which they themselves can have no share. It is always the right food on which they lay their eggs. Some caterpillars are such lusty fellows that they thrive on almost any sort of diet, and can go from one plant type to another without ill effect. Generally, however, there is one food, and one only, for a species. If that fails, the caterpillar will die in the midst of abundance, starved where other caterpillars of different species flourish. The parents, to which solid food has no meaning, infallibly find it for the offspring which they may never live to see, which will never be able to return them thanks.

THE INSTINCT THAT ANSWERS NATURE'S SOUNDLESS CALL

Between the caterpillar stage and that of the perfect insect there is a gulf as great as living death. All recollection of food eaten must be wiped out. Yet Nature, by some secret, soundless call, guides the parent to the appointed tree, bush or weed. There, on the very substance essential to the creature yet unborn, the egg is laid. There is no more perfect example in the world of unerring instinct.

Like the flies, the moths and butterflies are fully developed when they leave the chrysalis. There is no growth afterward for them, whether they be tiny moths of the leaf-mining group, a mere eighth of an inch across the wings, or the giant Atlas Moth of Africa, the Titan of all the *Lepidoptera,* which has a wing-span of nearly a foot!

The caterpillar must eat enough food for all three stages of life—the larva, the chrysalis and the perfect insect, or imago. The stages which follow that of the caterpillar are those of change, not extension of size.

MAGIC OF THE BUTTERFLY'S GLORIES REVEALED IN ONE WORD

The ugly word *Lepidoptera* is the scientific description of the whole order of moths and butterflies. It tells in a single group of letters the magic of the butterfly's glories. All these insects have their wings covered with scales, and their name means "scale-winged."

The make-up of a caterpillar does not suggest anything of this sort. The skin may be smooth, it may be spiny, hairy, armed with sharp prickles tipped with natural gum, but there is never a vestige of scales. Except that it has a very complicated head, with tough, horny jaws, eyes and feelers, it might be a worm with legs.

Yet how different is its career from that of the worm! Having eaten the shells of the eggs from which they emerge, the caterpillars begin a campaign of gorging and splitting. There is no other word for it. They live to eat. Behind the head are three pairs of jointed horny legs and claws which serve in the main to grip the food on which the larva feeds.

These occupy that part of the body which will be the chest, or thorax, of the butterfly, and from which three pairs of legs and two pairs of wings will arise. From the rear part of the caterpillar's body spring several pairs of fleshy false legs—pro-legs, as they are called—which will vanish in the chrysalis stage. Behind these again are two claspers at the end of the body.

THE APPETITE OF DIFFERENT FORMS OF LARVAL LIFE

These claspers play an important part in the activities of the Geometer caterpillars, commonly known as spanworms. Here the larvæ, instead of marching forward with the flowing motion of the ordi-

nary caterpillar, arches its body. Then, gripping by the claspers and pro-legs, it throws itself forward, retaining its grip in the manner described until the fore part of the body has reached a new position.

Like most other insects, caterpillars breathe by means of air tubes which open to the surface of the body. These we may see for ourselves along the sides of the body. The grub dies if these are sealed, and so it is a matter for wonder that the poor thing does not meet with disaster when the time comes for it to molt. For the caterpillar does molt: its entire skin has to be cast, again and again.

It eats and eats till it can eat no more, till the body has grown so great that its skin must burst unless the larva gets out of it. As the time of crisis approaches, the grub becomes sluggish and its appetite fails. It might be sickening for death instead of for a new jacket, so ill it seems. But at the appointed moment the skin splits down the back, and out crawls the caterpillar with a new and lustrous skin already in position beneath that which it discards as outgrown.

Appetite again returns, and once more the story of gorging is continued. The amount of food eaten is truly enormous, when we consider the size of the diner. The Privet Hawk-moth caterpillar devours 11,000 times its own weight in food during its larval life. The larva of *Polyphemus* consumes three-quarters of a pound of leaves and half an ounce of water during its lusty two months' career—a quantity equal to 86,000 times the weight of itself at birth.

THE GOAT-MOTH CATERPILLAR'S AMAZING POWER OF DESTRUCTION

It is not surprising, then, that the caterpillar of the Goat-moth finally reaches a weight 72,000 times as great as the weight it represented when newly hatched from the egg. But the goat-moth caterpillar is one of the marvels of the tribe. Its egg is laid in a chink in the bark, whence, when hatched, the larva creeps into the tree, gnawing a way before it as it goes.

At first its tunnelings are small, like itself, but as time goes on these become considerable, so that at the end of three, four or five years of the larval stage the caterpillar has done serious damage to the tree which is its home and its meals.

But there are other places than the interior of oak-tree trunks for caterpillars. We find them in the wood of many trees, in reeds, down in the soil among roots, but, of course, mainly on the foliage of vegetation. For defense most of them depend upon protective resemblance to their surroundings. The beautiful markings of the hawk-moth caterpillars harmonize extraordinarily with their leafy background flecked with light, and so do the color-schemes of hundreds of others.

THE CATERPILLAR'S WONDERFUL LIFE-LINE OF SELF-SPUN SILK

Those that are less highly specialized in color retire to the soil when day dawns, or tunnel the leaves and live there, or spin tents of web and live in numbers together. Others are defended from enemies by poisonous hairs.

Then there are the leaf-rollers, which cement together two edges of a leaf or two different leaves, and in that make their home, rendered snug by a couch of web spun from their silk gland. They leave open one end of the retreat, and from that, at the first sign of danger, they back out, spin a strand of web, and so descend out of harm's way. Many others have the same reliance on this self-furnished life-line. Sometimes we may see hosts of caterpillars lowering themselves from linden, poplar and oak, swaying from the ladder of silk which is being spun before our eyes from the gland beneath the head.

It is in this situation that the poisonous species distil their venom. Some merely cause a flow of virus at a touch, but others, like the Puss-moth larva, spit out their poison a considerable distance, like little snakes. These caterpillars are to be avoided by unshaded eyes, for the fluid causes blistering of a sensitive skin.

WHEN THE HOUR COMES FOR MOTH AND CATERPILLAR

Well, whatever the kind, the great hour comes for change. The last meal has been eaten; the caterpillar must prepare for the paramount marvel of its life. It is to become a chrysalis. With the butterflies the outer skin goes, a wisp of silk is woven round the golden husk, and all is over. But the moths invest themselves in elaborate coverings of silk.

The woolly bears weave their now useless hairs into their silken cocoons; the larvæ of the *Dicranura* masticate such

difficult material as wood and even sandstone, and mix that with their silk. Most wonderful of all, a recently discovered African moth of the *Nyctemera* group wraps itself in a cloak of bubbles of its own creating, like the citadel of the cuckoo-spit, and in that passes its time of trance.

Some moths and butterflies have two batches of eggs a year; some only one. In most cases the earlier batch of eggs will develop into adult insects the same season. Those laid later in the year may carry the cycle as far as the chrysalis stage. In this they will remain all winter. A few species require more than one year to develop.

The caterpillars of the goat-moth, the hawk-moth and others sleep through the winter. The writer had an experience of this with 250 tiger-caterpillars, which were accidentally starved for two weeks at a critical time of their career. They survived, thin and miserable, to resume feeding at Christmas and to complete their change in the following year.

How the Silk-moth has been Domesticated by Man

Within the chrysalis a marvelous transformation takes place. Not always, for we do not permit it to happen with the majority of Silk-moth cocoons. This moth, however, has become an entirely domesticated species, bred in captivity. The females do not seek to fly away, nor the caterpillars to wander, but rest in the place where they are hatched and fed.

Silk of unmatched quality is produced by these caterpillars. It is woven, scores and scores of yards of thread to a single cocoon, to form a rest and refuge while the change from grub to moth is made. Only a sufficient number to keep up the supply of eggs is permitted to undergo the complete change. The remainder, when the cocoons are spun and the caterpillars deeply entranced within, are steeped in hot water, which destroys life and leaves the human owner to unwind the silk and weave it into the goods of commerce.

Probably bees have been the most beneficial insects we have ever had, but from the dawn of trade and manufacture no other little creature has so romantically enriched the world as the Silkworm. How and when man found that he could use the covering spun by these caterpillars we do not know.

The Romantic Origin of the Silk Industry in Europe

For thousands of years silk has been an industry in China. From China silk-moth eggs were stolen nearly fifteen hundred years ago and brought, hidden in hollow bamboos, to Europe. From that small stock descended all the silkworms which, century after century, have spun the silks that have made France and Italy famous all over the earth for their products from this delightful material.

During the second half of the nineteenth century disease attacked the European stocks of silk-moths. One of the most important of the industries of two great nations was threatened, and a despairing call was made to the great genius Louis Pasteur to check the malady. He had never seen a cocoon, knew nothing of the life-story of the insect; but, nothing doubting, he went to Henri Fabre and asked to see the cocoon which he understood the caterpillars formed.

Fabre handed him one. Pasteur shook it near his ear and said with surprise: "Why, it makes a noise; there's something inside."

Fabre explained that it was the chrysalis, and Pasteur asked him what he meant. "I mean the sort of mummy into which the caterpillar changes before becoming a moth," answered the famous old naturalist.

"And has every cocoon a chrysalis inside it?" asked the astonished scientist.

"Obviously," replied Fabre; "it is to protect the chrysalis that the caterpillar spins its cocoons."

"Really!" said the great man, humbly.

From that time the modest Pasteur studied and toiled, mastered his subject, and stamped out the disease which had baffled Fabre and all the other naturalists; and so he saved France and Italy from losses resembling those of a great war.

From the Ugly Duckling to the Beautiful Swan of the Legend

Yes, the cocoon is to protect the chrysalis during one of the great changes. A loathly grub enters the cocoon, divests itself of its skin for the last time, and lies like a hibernating or paralyzed animal. It is quite inert, helpless, so cold that you think it dead unless you hold it in your warm hand and see it faintly wriggle. But as it lies there motionless a miracle of transformation is in progress.

Nothing remains unchanged, save perhaps the system of breathing. Jaws, claws, claspers, pro-legs, digestive system, even the very outline, all go. Yet if we patiently watch the horny case day after day we may see a new wonder coming into existence before our eyes. The shapes of the head, legs and thorax gradually appear upon the chrysalis case, the spiracles show themselves along the sides—the first rough draft of the Master Artist's work is seen in low relief on the horny case of chitin, as the substance of the covering is called. The given hour arrives and the resurrection has come. A hideous grub has vanished; a winged creature, fair as flowers, is here in its place. The case is slowly forced apart from within and the Sleeping Princess is astir and emerging. Or, if you will, the Ugly Duckling has been transformed and the Swan of legend is before us.

THE MAJESTY OF COLOR DUE TO THE PROPERTIES OF LIGHT

However, without such aids to appreciation we may for ourselves behold and value the marvel revealed for our delight. Out of the sheltering husk comes a trembling, feeble promise of perfection. Its wings are strangely doubled and bent, its scales are all upright, like the coat of a suffering horse. Courage and strength come with the occasion. A rush of blood is swept from the central supply along the veins of the wings, which straighten out and become strong. The scales, packed, as we first see them, for economy of space in the prison, settle into their correct positions. The effect is as if new color and radiance had suddenly descended on the little stranger.

The color we see there on those magic wings is not pigment: it is light broken and refracted by those minute scales. There is something before us resplendent as the most gorgeous humming-bird, the vainest peacock, the sweetest flower; and all that majesty of color is due to the properties of light. Butterfly beauty is indeed light shattered into abiding glory on tiny scales too fine for the unaided eye to see apart from each other.

Nor is this the end of the tale of beauty and wonder. Butterflies have often been called "aerial flowers." Little did those who first bestowed the name dream that butterflies possess, not only the color of flowers, but a kindred scent. This is hard to believe.

THE SCENT WHICH SOME BUTTERFLIES HAVE

Not all butterflies have this odor. In some cases scent glands are local; in others they are widely diffused. The scales of the wings include certain scent plumules, from which a grateful perfume is broadcast, apparently at the will of the owner. We suppose that to be so from the fact that the scent glands communicate with air tubes, by means of which pneumatic pressure can be exerted to scatter the pleasant odor as the butterfly desires.

In the common English Clouded Yellow Butterfly these scent patches are restricted to well-defined areas along the wing, a particular in which this species has its parallel in a tropical representative of the Brimstone Butterfly.

Our Fritillaries have the scent organs along the middle nervures of the fore wings; the Meadow Browns and their closest kindred have them on the disks of the fore wings; the Skippers also have scent patches, but in varying positions for different species.

In human society it is women who delight to have perfume about their apparel, but in Nature we find only the male butterflies endowed with the gift of creating a sweet atmosphere with which to attract the opposite sex. The female can easily trace her scented suitor, but how can he trace her? There we have another mystery of the *Lepidoptera*. There seems no doubt that they have means of communication unknown to us. A naturalist makes a female moth prisoner in a tiny open-fronted cage, out in his garden at night, when none of her species appears to be within range. Males flock at once to her dungeon from all quarters of the compass. "They flew for miles," we often hear it said, but there is no proof as to the distance from which the anxious lovers come. That the presence of a little female of their kind does attract the males in astounding numbers, is all we know. Even if they fly to her only from hundreds of yards, instead of miles, the fact is sufficiently notable. How do they know, out of sight, out of hearing, that she is there?

THE INSECT-CRIES THAT OUR EARS ARE TOO DULL TO CATCH

It cannot be sight, for though moths' eyes are large, and the insects fly well in the dark, the things they see are such

as reflect the little light available. All the white flowers which open and scent the air at night are moth lighthouses, stored with nectar for them. Even human beings, with their different eyes, can see white in comparative darkness. But a tiny distant moth? No, it cannot be vision that draws distant wooers and gallants to the little cage.

The more we advance into the mysterious domain of wireless, the more men incline to believe that insects in general, and moths and butterflies in particular, have their own natural equivalent of our artificial system. It is clearly proved that a bat, deprived of eyes and hearing, still receives impressions on its skin which enable it to avoid the smallest obstacle in flying. Some of the bats have cries so shrill and high that only the sharpest ears of young people can hear them.

If bats are specialized so highly, and so unexpectedly, then why should not moths and butterflies be equally specialized in another direction? They may be sending out cries which our ears are too dull to catch, and their antennæ may be the aerials to arrest the sound-waves so created. We may never know the truth, but it is certain that entomologists will never rest content so long as the mystery remains unsolved.

The co-operation between the two sexes brings strange things to pass in the world of these insects. Quite a new thing has happened in this connection within the lifetime of young readers of this book, and the detested winter moth is the hero.

How the male winter moth saves the females from death

Female Winter Moths are wingless. They lay their eggs on the branches of fruit trees and die. The caterpillars devour the foliage; then, when about to undergo their change, they descend to the ground and bury themselves in the earth or in crannies of the bark of the tree.

The new generation of males, when they leave the pupa stage, fly like other moths; but the females, in order to lay their eggs, must climb the tree-trunks, like caterpillars. To prevent them from getting up and sowing the seeds of ruin amid the branches, fruit-growers place bands of paper heavily smeared with a thick sticky substance around the trunks of the trees. This catches thousands of the crawling females.

At times their numbers are so great that, like the rabbits which at last overtop the wire fences of Australian farms, using the heaps of their own dead as a footpath, the females of the winter moth are able to crawl over *their* dead to the boughs beyond.

But the thing to marvel at is not that, but something very different. Where banding has been for some years generally practiced on fruit farms it was found that the males had learned a lesson. Instead of dooming their females to death by attempting to pass the deadly bands, they met them in a region of safety, short of the death trap, and *carried them to the tops of the trees!*

If that habit should become general in fruit-growing areas it would mean that one of the safeguards for our orchards has been defeated. This is an unexpected and amazing example of adaptability in an order of insects credited with a very low degree of intelligence. Yet such a thing would not be without parallel.

The moth that steals into the hive and carries off honey

The great Death's-head Moth enters beehives and steals the honey of the workers. The bees could instantly sting it to death if they chose. Some say that it has a cry similar to the murmuring of their queen and so they leave it unharmed to rob them at will. That is a death's-head habit to-day, inherited and passed on from generation to generation, but it had a beginning, as this new habit of the winter moths has had, in our own time. There is art, there is craft, there is intelligence of a sort in every phase of animal life, if we have but the patience to explore and the good fortune to discover its operations.

The loveliness of the butterflies that gladden the eye

Ugly and destructive in the caterpillar stage, moths and butterflies are things to gladden the eyes and senses in their complete condition—that is, if we can forget the damage for which their progeny is responsible.

Who is there so dead to romance and loveliness as to ban from the scheme of open-air beauties the Admirals, the Peacocks, the Swallowtails, the Skippers, the dashing Hawks and Emperors? Then, too, there are the Painted Beauty and the Painted Lady, the Mourning Cloak

(called Camberwell Beauty in England), and the Pearl Crescent, one of the commonest of all.

Some other beautiful American butterflies

The Hairstreaks, about fifty of them, belong to the same family as the Coppers and Blues. All are dainty and delicate and very lively. We must also speak of the Viceroy, which closely resembles the Monarch. Both are reddish brown, with black bands and white dots. The Viceroys which emerge from their chrysalis in the autumn also lay eggs the same year, and the caterpillars, after they hatch, build little houses from leaves and live through the winter in them, coming out as butterflies in the spring. The Vicereine found in the Gulf states resembles the Viceroy except that it is darker. The Banded Purple and the Red-spotted Purple are closely related to these.

The Monarch, or Milkweed Butterfly, is a gorgeous fellow. The Meadow Browns, or Satyrs, are slow in developing and are also slow on the wing. The commonest among them are: the Pearly Eye, which loves the moist woods; the Eyed Brown, generally found in grass along the streams; the White Mountain Butterfly, which often requires two years to mature; and the Arctic Satyr, which lives in the Far North. The Zebra is an interesting tropical butterfly which migrates to the Gulf states. They are sometimes four inches across the brownish black wings which are barred with yellow stripes. They roost in flocks in the woods.

These are not all of our butterflies and moths. Over seven thousand species of *Lepidoptera* are found in North America north of Mexico. So you see that we cannot even give the names of very many. It is hopeless to begin a catalogue, for it requires entire books to deal with colors, shapes, habits and localities.

Nearly every moth and every butterfly performs useful service in fertilizing the vegetable growths from which it draws its food supplies, or in some other compensatory act. Every destructive group of caterpillars has its cousins at work for the good of our land.

Man's interference with the course of nature

Take the Clothes-moth, for example. This moth, as a moth, is harmless. It lays its eggs on our woolen clothes, carpets, tapestries, and what not. The caterpillars are the villains of the story. They eat the material and ruin it, spoiling the one good suit which a poor man has, the one good carpet in his house, the one lovely example of tapestry which church or mansion cherishes. In the same group of moths are those whose caterpillars are a curse to granaries, where they eat much grain and ruin more.

Moths and butterflies were meant to give rise to caterpillars which should act as a check on excessive vegetation. The Clothes-moth probably once ate the wool and hair rubbed from sheep and cattle and other animals which would have been a nuisance in the grass.

Their natural enemies were birds, innocent reptiles and insect-eating insects. We have killed the birds and banished the reptiles, and the other parasites cannot keep pace with the enormous increase for which our system of cultivation has made way. Every year we have caterpillar plagues of some sort. In small gardens it often happens that the Large and Small Cabbage White butterflies produce so many eggs that the caterpillars destroy every cabbage that the householder grows.

The Pea-moth sullies our peas, in which we find its hateful larvæ; there is a vile Codling moth whose caterpillar, by a method of inspired villainy, enters our apples, tunnels and defiles them and causes them to topple at the first gust of wind—windfalls; there is a moth that haunts the foliage of our currants, another that tunnels them; a moth that bores into the stems of corn.

The caterpillar one of the gravest problems of our life

Indeed, we have scarcely a single growth in forest, garden or field for which Nature has not provided a hungry enemy in the shape of caterpillar from moth or butterfly. Of the little wretches whose larvæ mine the leaves of our flowers and vegetables, already several hundred species are known in America alone. Where they flourish not a plant remains unmarred.

Caterpillars are indeed a grave problem. They are the occasion of huge loss to the agriculturist and fruit farmer; they cause unending disappointment and dismay to those whose joy is a garden, large or small.

THE NEXT STORY OF ANIMAL LIFE IS ON PAGE 6623.

AMERICAN BUTTERFLIES AND MOTHS

1. Peacock Eye (*Junonia cænia*). 2. Southern Cabbage (*Pieris protodice*). 3. Baltimore (*Melitæa phaeton*). 4. Common Blue (*Lycæna pseudargiolus*). 5. Tiger Swallowtail (*Papilio turnus*). 6. Swallowtail (*Papilio asterias*). 7. Pearl Crescent (*Phyciodes tharos*). 8. Viceroy (*Basilarchia archippus*). 9. Monarch (*Anosia plexippus*). 10. Orange (*Terias nicippe*). 11. Red-spotted Purple (*Basilarchia astyanax*). 12. Orange Tip (*Euchloe genutia*).

1. Skipper (*Epargyreus tityrus*). 2. Zebra (*Heliconius charithonius*). 3. Common Sulphur (*Colias philodice*). 4. Regal Moth (*Citheronia regalis*). 5. Hawkmoth (*Calasymbolus excæcatus*). 6. Humming-bird Moth (*Hemaris thysbe*). 7. Bella (*Utetheisa bella*). 8. Male Gipsy-moth (*Porthetria dispar*). 9. Female Gipsy-moth (*Porthetria dispar*). 10. Common Wood Nymph (*Satyrus alope*). 11. Red Underwing (*Catocala cara*). 12. Fritillary (*Argynnis cybele*). 13. Grapevine Moth (*Alypia octoma*). 14. Browntail Moth (*Euproctis chrysorrhœa*). 15. Codling Moth (*Carpocapsc pomonella*). 16. Io (*Automeris io*).

BUTTERFLIES, CHIEFLY TROPICAL

Below are the names and places of the insects above; the figures show the size in inches across the open wings.

1. Leptocircus Curius (2), Assam. 2. Papilio Weiskei (3½), New Guinea. 3. Tenaris Catops (3½), New Guinea. 4. Hebomoia Celebensis (4½), Celebes. 5. Ornithoptera Brookeana (7), Borneo. 6. Callithea Hewitsoni (2½), Colombia. 7. Catagramma Pitheas (2¼), Colombia. 8. Troides Alexandræ, male (8½), New Guinea, largest of all butterflies, female measuring 10 to 12 inches. 9. Cethosia Myrma (4), Celebes. 10. Ornithoptera Cassandra (6½), North Queensland. 11. Ornithoptera Paradisea (6), New Guinea. 12. Terinos Clarissa (3½), New Guinea. 13. Delias Niepelti (2½), New Guinea.

1. Ornithoptera Flavicollis (5 ½), East Indies. 2. Papilio Ulysses (5 ½), Malay Archipelago. 3. Morpho Rhetenor (5 ½), Guiana. 4. Urania Sloanus (3), Jamaica. 5. Junonia Orithya (2 ¼), India. 6. Morpho Deidamia (6), French Guiana. 7. Dercas Gobrias (2 ¾), Sumatra. 8. Ornithoptera Crœsus (7), Amboina, Moluccas, East Indian Archipelago. 9. Morpho Cypris (5 ½), Colombia. 10. Papilio Euchenor (5), New Guinea. 11. Catagramma Excelsissima (2 ½), Peru. 12. Parnassius Apollo (3), Alps, Europe. 13. Callithea Depuiseti (2 ½), Peru.

1. Charaxes Jasius (4), Europe. 2. Stichophthalma Howqua (5½), China. 3. Armandia Thaidina (4), China. 4. Thecla Imperialis (1½), South America. 5. Ornithoptera Victoriæ (7), Solomon Islands. 6. Papilio Thoas (5), United States and Central America. 7. Attacus Atlas (11), Himalayas, India. 8. Papilio Homerus (6), Jamaica. 9. Agrias Lugens (4), Peru. 10. Saturnia Pyri (5¼), Southern France. 11. Grællsia Isabellæ (4), Spain. 12. Euripus Charonda (4½), Japan. 13. Papilio Blumei (5½), Celebes. 14. Agarista Agricola (3), Brisbane.

1. Campylotes Histrionicus (3), Northern India. 2. Arctia Hebe (2), Europe. 3. Leto Venus (6), South Africa. 4. Papilio Memnon (6), Assam. 5. Argema Mittrei (9½ inches long, 8 inches across; the most wonderful moth in the world), Madagascar. 6. Citherias Menander, or Clearwing Aurora (2½), Colombia. 7. Actias Selene, or Moon Moth (6), Assam. 8. Papilio Antimachus (8½), Stanley Pool, Congo. 9. Urania Riphœus (4½), Madagascar. 10. Erasmia Pulchella (4), Assam. 11. Teinopalpus Imperialis (3½), Darjeeling, India.

SOME STRANGE CATERPILLARS

1. Pear-tree Silk-moth (*Saturnia pyri*), India. 2. Laocoön Walnut Moth (*Citheronia laocoon*), Brazil. 3. Eacles Cacicus, Brazil. 4. Cricula Trifenestrata, Himalayas. 5. Rosy Maple Moth (*Anisota rubicunda*), United States. 6. Honey-locust Moth (*Adelocephala isias*), Texas. 7. Citheronia regalis, Brazil. 8. Anisota Virginiensis, United States. 9. Anisota Consularis, United States. 10. Clanothus Silk-moth (*Samia rubra*), California. 11. Eupackardia Calleta, Mexico. 12. Urota Sinope, Natal. 13. Anisota Senatoria, United States. 14. Eacles Imperialis, United States. 15. Hooked Citheronia (*Citheronia phoronea*), South America. 16. Brahmea Japonica, Japan. 17. Anisota Stigma, United States. 18. Loepa Katinka, Sumatra. 19. Buck Moth (*Hemileuca maia*), United States. 20. Bunæa Caffra, South Africa.

1. Samia Gloveri, Rocky Mountains. 2. Vishnu Moth (*Trabala vishnu*), India. 3. Nudaurella Cytheria, South Africa. 4. Sysphinx Molina, Central America. 5. Orizaba Silk moth (*Rothschildia orizaba*), Mexico. 6, Goniometer Robusta, Rhodesia. 7. Chærocampa Celeris, India. 8. Fusemia Bisma, India. 9. Automeris Comosta, India. 10. Phalanna Polymena, India. 11. Moon Silk-moth (*Actias selene*), India. 12. Four-horned Sphinx (*Ceratonia amyntor*), United States. 13. Silk-moth (*Attacus atlas*), India. 14. Thyella Tyrrhæa, South Africa. 15. Phyllosamia Cynthia, China. 16. Telea Polyphemus, United States. 17. Automeris Pamina, United States. 18. Coloradia Venata, Argentina. 19. Jorulla Silk-moth (*Rothschildia jorulla*), Mexico. 20. Columbian Silk-moth (*Samia columbia*), United States.

BUTTERFLIES, CHIEFLY EUROPEAN

The butterflies and moths in the pages following are principally European, though a few of them are also found in America, as you have learned in the text. In many other cases we have a butterfly closely resembling the one shown on these pages, though it may not be absolutely identical.

1. Large Skipper (*Augiades sylvanus*). 2. Pale Clouded Yellow (*Colias hyale*). 3. Silver-spotted Skipper (*Augiades comma*). 4. Painted Lady (*Pyrameis cardui*). 5. Silver-washed Fritillary (*Argynnis paphia*). 6. Large White (*Pieris brassicæ*). 7 Chalk Hill Blue (*Lycæna Corydon*). 8. Camberwell Beauty (*Vanessa antiopa*). 9. Large Blue (*Nomiades arion*).

1. Pearl-bordered Fritillary (*Argynnis euphrosyne*). 2. Mountain Ringlet (*Erebia epiphron*). 3. Orange Tip (*Euchloe cardamines*). 4. White-letter Hairstreak (*Thecla W-album*). 5. Wood White (*Leucophasia sinapis*). 6. Green-veined White (*Pieris napi*). 7. Grayling (*Satyrus semele*). 8. Silver-studded Blue (*Lycæna ægon*). 9. Dark Green Fritillary (*Argynnis aglaia*). 10. Green Hairstreak (*Thecla rubi*).

1. Northern Brown, or Scotch, Argus (*Erebia blandina*). 2. Speckled Wood (*Pararge egeria*). 3. Azure, or Holly, Blue (*Cyaniris argiolus*). 4. Small Copper (*Chrysophanus phlæas*). 5. Clouded Yellow (*Colias edusa*). 6. White Admiral (*Limenitis sibylla*). 7. Small White (*Pieris rapæ*). 8. Grizzled Skipper (*Hesperia malvæ*). 9. Red Admiral (*Pyrameis atalanta*). 10. Brown Argus (*Lycæna astrarche*).

1. Clifden, or Adonis, Blue (*Lycæna bellargus*). 2. Small Skipper (*Adopæa thaumas*). 3. Common Blue (*Lycæna icarus*). 4. Large Tortoiseshell (*Vanessa polychloros*). 5. Small Heath (*Cænonympha pamphilus*). 6. Brimstone (*Gonepteryx rhamni*). 7. Dingy Skipper (*Thanaos tages*). 8. Marbled White (*Melanargia galatea*). 9. Peacock (*Vanessa io*). 10. Wall (*Pararge megæra*).

1. Greasy, or Marsh, Fritillary (*Melitæa aurinia*). 2. Black-veined White (*Aporia crataegi*). 3. Heath Fritillary (*Melitæa athalia*). 4. Small Tortoiseshell (*Vanessa urticæ*). 5. Comma (*Polygonia C-album*). 6. Purple Emperor (*Apatura iris*). 7. Purple Hairstreak (*Zephyrus quercus*). 8. Swallowtail (*Papilio machaon*). 9. Black Hairstreak (*Thecla pruni*).

1. Small, or Bedford, Blue (*Zizera minima*). 2. Essex Skipper (*Adopæa lineola*). 3. Duke of Burgundy Fritillary (*Nemeobius lucina*). 4. Lulworth Skipper (*Adopæa actæon*). 5. Checkered Skipper (*Carterocephalus palæmon*). 6. Brown Hairstreak (*Zephyrus betulæ*). 7. Large Heath, or Marsh, Ringlet (*Cænonympha typhon*). 8. Queen of Spain Fritillary (*Argynnis lathonia*). 9. Small Meadow Brown, or Gatekeeper (*Epinephele tithonus*). 10. Meadow Brown (*Epinephele janira*). 11. Ringlet (*Aphantopus hyperanthus*). 12. Glanville Fritillary (*Melitæa cinxia*). 13. High Brown Fritillary (*Argynnis adippe*). 14. Small Pearl-bordered Fritillary (*Argynnis selene*).

EUROPEAN MOTHS AND CATERPILLARS

1. Broad-bordered Yellow Underwing. 2. Spurge Hawk. 3. Large Emerald. 4. Goat. 5. Elephant Hawk. 6. Brimstone. 7. Pale Tussock. 8. Six-spotted Burnet. 9. Scarlet Tiger. 10. Leopard. 11. Copper Underwing. 12. Emperor. 13. Privet Hawk. 14. Clifden Nonpareil. 15. Lime Hawk. 16. December. 17. Peach Blossom. 18. Black Arches. 19. Lappet. 20. Buff-tip. 21. Cinnabar. 22. Pebble Prominent. 23. Oleander Hawk. 24. Lackey. 25. Small Eggar. 26. Humming-bird Hawk.

SOME EXTRAORDINARY BEETLES

1. Splendid dolichotoma. 2. Macropopillia beetle. 3. Emperor phanocus. 4. Great synonycna ladybird. 5. Bates monhotia. 6. Bennett's eupholus. 7. Violet golden-surface beetle. 8. Peratorrhina beetle. 9. Blue-and-yellow hare beetle. 10. Fourteen-spot podontia. 11. Solid heart-shaped sepidium. 12. Dorcasomus beetle. 13. Four-spot paratasia. 14. Marked arrhenodes. 15. Beautiful horned euchteanus. 16. Five-spot scaphidomorphus. 17. Jourdan's lapherus. 18. Pierced olive beetle. 19. Variegated darling beetle. 20. Rucker's jumnos. 21. Graceful lia beetle. 22. Ribboned proseisceia. 23. Precious leaf-footed beetle. 24. Single-horned xenarescus. 25. Muller's phalacrognathus. 26. Beautiful eupyrochroa. 27. Powerful tityus beetle. 28. Wallace's belus weevil. 29. Great agrilus.

Sluicing for gold at a mine in New Zealand.

WHAT BECOMES OF ALL THE GOLD?

CONTINUED FROM 6290

SOME of it wears away, and so is lost, but most of it remains in the world in some form or other. From the earliest times, long before what we call history began, gold was found in river sand. Its presence was detected by the gleaming grains of metal, which were separated from the soil by successive washings. Further search sometimes led to the discovery of nuggets of gold of various sizes. Primitive man used the precious metal to deck his body with ornaments made of beads strung together. Not until a later stage of his development did he learn how to work it into artistic forms and cast it into molds.

Traces of gold decoration have been found even on flint knives of the Stone Age. At the time of the First Dynasty in Egypt, more than five thousand years before the Christian Era, gold jewelry of exquisite fineness and artistic design was produced. Some of this remains to this day as a reminder that our boasted modern civilization, in some ways at least, has much to learn from the story of the long-buried past as it is revealed from time to time.

The total amount of gold produced in ancient times is unknown. That it was enormous may be judged by the estimates, frankly incredible though these are, of the money value of the gold collected by David and his successor for the building of the Temple at Jerusalem. These fabulous amounts vary between four and four and a half billion dollars. Though we can dismiss these figures, there is no doubt that gold was lavishly used. Solomon's yearly revenue in gold has been reckoned at over twenty millions of dollars.

Conquered nations were usually made to pay tribute in the form of gold, and enormous wealth passed from one owner to another. All the empires of the past amassed vast stocks of the precious metal by conquest. Even after the conqueror had carried off as much as could be found, there remained large amounts hoarded up or buried in the soil to evade detection. This practice of hoarding gold has been going on from time immemorial, especially in India and other Eastern countries. Considerable amounts of gold found a safe home in sacred temples until such time as a ruthless unbeliever robbed the shrine of its treasures. Solomon's temple was stripped in this way by Nebuchadnezzar.

On the whole it seems safe to assume that, though the world's store of gold changes hands with the turn of

Fortune's wheel, it has not appreciably diminished. Indeed, the reverse is probably true, for men have always been hunting for gold.

The discovery of America gave a great impetus to gold production, and the world's output from the end of the fifteenth century to the end of the World War has been valued at about $17,000,000,000. In the middle of the nineteenth century gold was found in large quantities in California and Australia. About 1882 mining was begun in the Transvaal, the gold output from the Rand becoming by far the largest in the world. Down to 1920 the value of the gold produced from these mines was over $3,000,000,000.

The question, What becomes of all the gold produced from the earth? is therefore difficult to answer with any degree of certainty. A great deal lies at the bottom of the sea, the vessels carrying it having sunk in deep waters. Wear and tear must account in the course of ages for a great deal more, especially so far as the gold used for coinage is concerned. The bulk of the gold produced every year, however, is used up in the jewelry and other luxury trades, and so can hardly be said to be lost.

It is probable that there is in existence to-day far more gold in various forms on the earth's surface than at any previous time in the world's history, and it is not impossible that some of the gold extracted in the days of Solomon has by devious ways reached Europe, or even America, in the course of trade.

WHY DO THE STARS TWINKLE?

No explanation yet offered has quite satisfied scientists as to why the stars twinkle. The theory that their light interferes with itself on its journey through space is not altogether satisfactory. The suggestion that the thin pencil of light from a star is disturbed in our atmosphere, thereby giving a twinkling effect, is also inadequate.

Another theory has been proposed by Professor Vegard, of Christiania University, Norway. He declares that on the borders of the earth's atmosphere is a layer made up of tiny crystals of nitrogen, or nitrogen dust; that the earth is inclosed in what has been described as a crystal globe; and that this layer of crystals high up in the atmosphere is responsible for some of the many strange things that happen. It makes long-distance wireless possible by reflecting the waves and preventing them from being lost in space. It is the cause of the greenish color of the Aurora Borealis; and to it is due the twinkling of the stars. The density of the dust-layer of nitrogen, Professor Vegard explains, is very small and the average distance between the particles is comparatively large. If we drew a line through the dust atmosphere it might cut only a few particles, and this number might undergo many rapid changes. When we look on a fixed star with the naked eye it is the average intensity through a cylinder, with a cross-section equal to the pupil of the eye, which determines the observed light intensity. Inside such a narrow cylinder the number of scattering particles may undergo many variations, and these variations may be seen as twinkling.

DO WE KNOW THE ACTUAL DATE OF CHRIST'S BIRTH?

Strange as it may seem, Jesus was born about 6 B.C.—that is, in the year 6 *Before Christ!* The exact year or month is not known, but the day was almost certainly not December 25, nor was the year that from which we date the Christian Era. This era was fixed by the Abbot Dionysius Exiguus in the sixth century, and places the birth of Jesus in the year of Rome 754. But Herod the Great died in the year of Rome 750. We know that Jesus was already born when Herod was alive, though how long this event took place before the death of Herod we cannot say. Certainly it was not later than 5 B.C. and probably was between 6 and 7 B.C. These facts were found out in later times when, of course, it was impossible to alter the calendar. As to the month in which Jesus was born, it could hardly have been December. Then the nights are cold, and shepherds with their flocks do not spend their nights in the open air as they were doing at the time of the Nativity. Shepherds began to camp out about the vernal equinox, March 25, so that almost certainly Jesus was born in the spring or summer.

WHEN WILL MONEY HAVE DOUBLED ITSELF AT COMPOUND INTEREST?

The number of years an amount takes to double itself at any rate of compound interest not exceeding ten per cent per

HOW THE BOWLS ARE MADE

Sawing up a log of lignum vitæ, the heavy wood of the West Indies from which bowls are made.

Shaping the bowls on a lathe from the blocks of lignum vitæ.

An expert testing the finished bowls for the bias, by releasing them from an automatic chute.

See question on page 6552.

annum is approximately the number 70 divided by the rate per cent of the interest.

Thus $100 loaned at compound interest at 5 per cent would become $200 in about $\frac{70}{5}$ years, or 14 years. The same sum loaned at simple interest at the same rate would double itself in 20 years.

WHAT DO WE MEAN BY CROSSING THE RUBICON?

The Rubicon is a small Italian river running into the Adriatic Sea sixty miles from the town of Rimini. At the time of Sulla, the famous Roman dictator, the short course of the Rubicon traced the frontier between the Roman province of Umbria and Cisalpine Gaul. Wishing to be guarded against renewed attacks, the Roman Senate had decreed that anyone crossing over the river with armed men would be regarded as a foe to the Republic. In 49 B.C. Julius Cæsar happened to be in Cisalpine Gaul with some legions when he heard of the intrigues Pompey was brewing against him in Rome. Cæsar made up his mind to revenge himself, and gathering his legions, marched toward Rome. The Rubicon lay on his way. To pass beyond was to wage war against the Republic of Rome. Cæsar stopped, hesitating for a few minutes on the bank of the river. At last he shouted: *Alea jacta est!* (The die is cast) and ordered his troops to cross over. Since that day the expression "to cross the Rubicon" has been applied to all decisive, unchangeable resolves that do not permit of drawing back, whatever the consequences.

WHAT MAKES THE BALL SWERVE IN A BOWLING GAME?

In the game of bowls, the balls do not roll in a straight line, but swerve round to one side or the other. Shakespeare, who knew the game well, makes one of his Queens say (in Richard II):

'Twill make me think the world is full of rubs,
And that my fortune runs against the bias.

The curved course of the bowl, as a bowling ball is called, is due to what is known as a bias. This word really means "two-faced," and that is what the bowl is. It is not a perfect sphere, although it may seem to be so, for one side is a little rounder than the other. In other words, the difference is such that if it were greatly exaggerated the bowl would look like a pear or a peg-top. One side of the bowl is shaped like half an orange, and the other more or less like half a lemon. The curvature of path is on the side marked by an ivory disk, the difference being almost too slight to be detected by sight or touch. At one time the bias was produced by inserting a piece of lead on one side of the bowl, but this practice is now generally discarded, and reliance is placed on the turning in the making. See pictures on page 6551.

WHAT MAKES THE COLORS OF THE SUNSET?

When the sun is setting its light does not come so straight down as when it is high in the sky. In order to reach our eyes, the light then has to pass through a long layer of air. If you stick a needle straight into an orange it does not have to go far through the peel before it gets inside. If you stick it sideways in the orange it has a long journey through the peel before it gets inside. So the light from the setting sun passes through so much air, and through all the dust and smoke, and so on, that is in the air. All these take something out of the white light, and throw out what they do not take. The things floating in the air are of all sizes, and we see many different colors. So it comes about that sunsets are often finer when the air is not pure.

WHY DO BOOKMAKERS GILD THE TOPS OF BOOKS?

Makers of books gild the top of a book partly for appearance and partly to present a smooth surface which will not so readily collect dust as the rough paper edges. The under-surface of a book is seldom seen when a book is in a bookcase and is less exposed to dust. In many cases the front of the book is also gilded. Sometimes the edges of the leaves are gilded all around.

WHY IS A SILVER SPOON BLACKENED BY EGG?

A silver or silver-plated egg spoon is blackened by the egg because the sulphur in the proteins of the egg combines with the silver of the spoon to form silver sulphid, which is a black substance. The sulphur in the egg, when the egg gets stale and begins to decompose, combines with the hydrogen in the egg, and so forms sulphureted hydrogen. This gas gives to bad eggs their offensive odor. When spoons of nickel or pewter are used no blackening takes place.

HOW DOES A SPIRIT LEVEL WORK?

A glass tube is nearly filled with spirit, and then sealed at both ends, so that when it is perfectly level—that is, parallel with the horizon—the bubble of air left inside with the spirit is exactly under a line marked on the middle of the tube. The tube is fixed in a brass or wooden case very carefully made, so that when laid on a level surface the bubble is seen below the middle line. In this way the level of any surface, whether in carpentry or in building or in engineering, can be exactly tested. Sometimes pure alcohol is used, sometimes a mixture of ether and alcohol, and sometimes pure ether—ether without water—is used. The aim is to get a liquid so sensitive that the air bubble in it moves with the very slightest variation in the surface to be tested.

WHY DOES A BAD EGG FLOAT AND A GOOD EGG SINK?

A hen's egg newly laid consists of a mass of yolk, together with what we call the white of the egg. Being heavier than water, these will cause the egg to sink when it is placed in water. But in an egg which has become rotten the yolk and white have split up into other things. They have produced gases which make the egg much lighter than it was before. Such an egg does not weigh as much as an equal bulk of water does. If placed in water it will not sink. It floats as an iron ship does, and for precisely the same reason—that it is less heavy than the same bulk of water.

WHAT IS THE INDIAN'S PIPE OF PEACE?

The Indian pipe of peace, called the calumet, after the reed from which it is made, is a long pipe in which wild tribes, especially those of North America, smoke dried leaves of tobacco or other aromatic plants. The greatest veneration is attached to the calumet, which the Illinois tribe pretend originated from the sun itself. It is about two feet long, made of varnished earth, and adorned with plaited hair and showy feathers most artistically worked.

The calumet is a symbol of peace, but sometimes also of war. The exchange of the famous pipe between two camps means an eager desire for friendliness. On the contrary, any chief refusing to smoke a calumet offered to him is considered as an enemy ready to wage war.

WHAT ARE THE HIGHEST MOUNTAINS?

Asia comes easily first in lofty mountains, for she has several ranges with peaks higher than the highest peaks in the other continents. Mount Everest, over 29,000 feet, in the Himalayas, is the highest mountain in the world. Also in the Himalayas are Mount Godwin-Austen (K 2) and Kanchanganga I, both over 28,000 feet, and Kanchanganga II and Makalu, both over 27,000 feet. Aconcagua, the highest mountain in the American Andes, is 23,000 feet. Mount McKinley in Alaska is 20,300 feet, while the height of Mont Blanc, in the Alps, is less than 16,000 feet.

WILL THE EARTH EVER BE COOL RIGHT THROUGH?

Very young children, when they want to cool their tea, sometimes put it in the saucer, partly because the cold saucer takes some of the heat, but especially because it spreads the tea out, and so exposes it to the cooling air. In the same way, when we go bathing on a sunny day we find the shallow pools on the way to the sea or lake much warmer than the larger body of water. Heat can get in and get out when things are exposed. If we take a thing like a hot bottle and wrap it up in a thick layer of blankets, it will stay hot for many hours. Now, there never were better blankets than those which the fire inside the earth is packed in. The air is a blanket many miles thick. The crust of the earth, too, is a blanket. These blankets are being warmed from outside by means of the sun. Then, too, new heat is being made by radium. We can therefore be reasonably sure that it will be many long ages before the earth is cooled through.

WHAT DOES HABEAS CORPUS MEAN?

Habeas corpus is Latin for "produce the body." It is against British and American laws for anyone to be held a prisoner except on a charge for which he has been, or is about to be, tried. If he is so held, an application may be made to a court of justice for an order requiring him to be brought before the court for a decision as to the legality of his detention. This order, which is addressed to whoever has him in custody, is called a writ of habeas corpus. This law, set out in the Magna Carta, was actually in existence before that charter.

HOW MANY ISLANDS ARE THERE IN THE BRITISH ISLES?

Usually when we speak of the British Isles we mean the two large islands of Great Britain and Ireland. If we take all the smaller islands and islets into consideration we come to the surprising fact that the British Isles number over 5,000, most of them uninhabited. There are 500 Hebrides, of which about one-fifth are inhabited. The Orkneys and Shetlands have 190 islands between them, with 57 inhabited. There are 140 Scilly Islands, though people live on only five. There are great numbers of small islands off the west coast of Ireland.

WHY DOES MY VOICE SEEM LOUDER IF I PUT MY HANDS OVER MY EARS?

We can help ourselves to answer this question if we consider the case of a sea-shell held over the ear. There is no sound made in the shell, but it picks up all the tiny sounds that are made in the room, and echoes them to the ear. Our hands held over our ears act in the same way. They echo the sounds as the shell does.

But it is true that the special case where the voice is our own is rather different from others. Perhaps we are inclined to think of sound as something that always flies "forward" from the place where it is made. But, just like the light of a candle, sound flies out equally in all directions, except in so far as special causes direct the waves or echo them.

Thus, the sound made by our voices travels around beside our ears, and is caught and echoed into them by our hands. Not only do our voices sound louder, but they also sound very strange to us. This is because we usually hear our voices partly through the air-waves coming against our ears, and partly by sound-waves traveling through the head to the ears from the voice-box. Anything that alters the proportion of these two seems to change the voice.

WHY HAS A FLOWER-POT A HOLE IN THE BOTTOM?

Like human beings, plants must have water to live, but stagnant water is almost as harmful to them as it is to us. If there were no hole at the bottom of the flower-pot, any water that the plant did not drink would not be able to escape. The mold would become stagnant mud in which the plant would soon die.

IF THE EARTH IS A BALL, WHY DOES AN EARTHQUAKE SHAKE ONLY PART OF IT?

People who study these things have just been telling us that we really need two words for what happens in what we call earthquakes, and this question suggests exactly the point they make. We should really speak of *earth-quakes* and of *earth-shakes*. In an earth-shake, the whole earth is shaken as it rolls through space, and this must happen because the earth is a ball, and we cannot shake part of a ball without shaking the whole of it.

But if the ball is a very large one, as the earth is, and if it is made of a great many different parts, including a crust of many layers, it is quite possible to have a disturbance somewhere that shakes one of these layers against another without shaking the ball as a whole so that we can notice it; and that is the kind of disturbance that we should call an earthquake, and not an earth-shake.

WHY DOES THE MOON GROW BRIGHTER AS THE SUN SETS?

If we watch the moon as the sun begins to set we shall see it grow brighter and brighter, until, when the night has come, it is quite bright. Of course it has really been shining all the time, but the sun is sending so much light to our eyes, both directly and reflected from the air, that the light of the moon seems pale.

WHY DOES A POTATO NOT ROT UNDER THE EARTH WHILE IT IS GROWING?

If certain kinds of low vegetable life are present in the soil they may attack even the living potato and rot it; but usually the potato is protected by two things. One is its skin, which exists chiefly to keep out microbes and other things that would otherwise feed on it and rot it. The other thing is the life in the living cells which make the potato, especially those cells which lie on the outside of it and are the best part of its food-value. So long as they are alive these cells have the power of protecting themselves from most dangerous things, such as microbes or insects. When a potato rots it is because some other living things are using it as their food. The rotting of the bodies of animals and plants is not to be thought of as something bad or horrible. It is simply a chemical change produced by the life of other living creatures whose life benefits as the thing they feed on suffers. All life, plant or animal, undergoes such changes.

WHAT IS THE MEANING OF SKYSCRAPER?

Many years ago a skyscraper was a triangular sail which mariners spread above their ordinary sails when in calm areas, in the hope of catching slight breezes. Nowadays the word has a very different meaning. It is used to describe the gigantic buildings in the business quarters of American cities, where land is very valuable. Instead of building along the ground, men have built hundreds of feet up into the air—so that an office is like a street running straight upward.

There are no real skyscrapers in London because regulations forbid structures to be above a certain height. It is also doubtful whether the clay under London would support their enormous weight. New York, however, stands on the rock of Manhattan Island. So many buildings, erected on foundations that are absolutely firm, now tower three hundred feet high, and some considerably more.

The giant of all skyscrapers is the Woolworth Building, which towers 792 feet above the pavement. It is a little city in itself. Built on foundations 110 feet deep in the rock of Manhattan, this great building of steel, concrete and marble is estimated to be of 223,000 tons weight. It has been designed to withstand wind strains of two hundred miles an hour.

Many companies have their offices in the Woolworth Building, and on working days there are 12,000 people employed there. To take this army of men and women to their offices, and also for the convenience of thousands of visitors, there are 27 high-speed elevators which serve the different floors at half-minute intervals. There are also two big elevators which go straight to the fifty-fourth story at a speed of 700 feet a min-

The great Woolworth Building, nearly 800 feet above the streets of New York.

ute. There are 1,800 telephones. Daylight finds its way in through 5,000 windows, while after dark the colossal building is lighted with 80,000 electric lamps of various powers.

Near the top of the building, on the fifty-eighth story, is an observation gallery. Every year one hundred thousand people ascend to this giddy height in order to see the wonderful view which lies around in all directions.

This mighty edifice is second in height only to the Eiffel Tower in Paris, which is 984 feet high. The word skyscraper is certainly expressive of its appearance from the street below.

WHY ARE SOME DAYS HOTTER THAN OTHERS?

There are several answers to this question. It may be that, though the sun itself has the same heat, its rays pierce the air much more slantwise on one day than on another. That is the difference between a winter day and a summer day. The less air distance the heat passes through, the more we feel it. If a warm wind is blowing past us, the day will be hotter than if a cold wind is blowing. That is to say, the heat of the day largely depends on the wind, as well as on the strength of the sun. Lastly, if the air contains a great deal of water-vapor, it can take up so much less from our bodies, and our perspiration has no chance to evaporate.

It is this evaporation of the perspiration from our skin that plays the chief part in keeping our bodies cool, though we are always making more heat as we live. If the evaporation is made slow by the fact that the air already holds nearly all the water-vapor that it can, we get warm, and say the day is hot. It may not really be any hotter than another day which feels far cooler. But we judge by our feelings, and they are largely determined by the way we dispose of the water that is continually poured out by our skin and from our lungs.

IS A FALLING STAR ONE OF THE STARS WE SEE IN THE SKY?

The things that fall, and are called falling stars, are not stars at all. If a real star fell into the earth—or, rather, if the earth fell into a star—we should all be burned up by the heat long before the earth and the star could meet each other. The things that fall are quite small stones, or balls of iron, or other elements. They sometimes fall all the way to the earth and can be picked up afterward. By far the greatest number of them, however, never reach the surface of the earth as stones, or meteorites, at all, for they are burned up or broken up into dust by the atmosphere. A great deal of the dust in the air, especially in the higher levels, is this meteor dust.

We see only a few of the falling meteorites that are caught by the earth. For one thing, we rarely see those that fall in the daytime. They are always made bright and hot as they pass through the air, but they are not nearly bright enough for our eyes to notice them when the sun is shining on our part of the earth. But, as these things are always reaching the earth, and as no matter can be destroyed, quite a lot of the present matter of the earth has been derived from meteors in this way. Meteoric dust can sometimes be found lying on the snow of the highest mountains.

WHY DOES THE SLOT OF A LETTER-BOX SLANT UPWARD?

The slot of a letter-box slants upward for two very good reasons. The first is that the upward slant makes it difficult for thieves to get anything out of the box. The second is that in wet weather the slant upward prevents the rain from driving in and wetting the letters.

WHAT IS THE DIFFERENCE BETWEEN SNOW AND HAIL?

Both snow and hail are made of water, as we see when they melt. Snow is water which has frozen in the form of crystals. These, of course, are ice-crystals. If the water had not frozen it would have fallen as rain. But hail is also made of ice-crystals, or water-crystals, as we might equally well call them. The difference between snow and hail is not a chemical difference at all—that is to say, not a difference of material. It is a difference in the way the crystals formed as the water was frozen in the sky, and in the way in which the crystals cling to each other.

It seems to be probably a very sudden cooling of the air when it contains a great deal of water-vapor which causes the crystals to form as hail. That, perhaps, is why we commonly get hail in summer and snow in winter. The air usually holds more water-vapor in summer and may therefore get more suddenly cooled by a cold wind than it does in winter.

HOW DID THE RED CROSS SOCIETY GET ITS EMBLEM?

The red cross on a white ground (the Swiss flag reversed) is the emblem of the Red Cross societies. These societies for the care of the wounded in war, were established under the Geneva Convention of 1864. By this Convention it was agreed that the hospitals, ambulances and their attendants showing this badge should not be fired upon or otherwise molested in their work. Originally the badge was a Maltese Cross (✠) similar to that worn by the knights of the Crusades. Now the plain Greek Cross (✚) is used. Now this emblem stands for help in disaster as well as in war.

WHY DO WE RISE TO THE SURFACE WHEN WE DIVE?

This is not a very easy question to answer. For one thing, it is possible to dive and not rise again. This may very easily happen when a man dives from a height into shallow water and does not do the right thing when he gets under. He may then strike the mud at the bottom and stay there. That is the danger of diving from too great a height into shallow water. In such a case the diver's body would naturally go deeper than the water before it came up again. The secret of his success is that he turns his hands after he enters the water, and so changes his course. Apart from this, the reason why the diver comes up again is to be found partly in the action of his arms and legs under the influence of the powerful instinct to get to the air again, and partly in the elastic rebound of the water after he has struck it. We must also remember that the pressure of the water gets greater with every descending foot. The diver's body, filled as his lungs are with air, is scarcely, if at all, heavier than the water itself. The case becomes different if he is injured, or if he is a drowning person unaccustomed to water, who breathes out into the water the air of his lungs, and then breathes water in. That is quite as bad as letting water get into the air-tight compartments of a boat.

WHAT IS MEANT BY THE TERM RED-LETTER DAY?

A red-letter day is one that stands out in our life as a happy and delightful day. In almanacs special days and holidays used to be printed in red ink to mark them off from ordinary days.

WHAT COUNTRIES ARE INCLUDED IN THE UNITED KINGDOM?

The United Kingdom of Great Britain and Ireland was the official title of the four countries, England, Wales, Scotland and Ireland represented in the British Parliament after the Act of Union came into force on January 1, 1801. When, in 1922, Southern Ireland became an independent dominion within the Empire, it was widely assumed that the title no longer applied. But Northern Ireland, though it has its own local parliament, still sends its representatives to Westminster, and so justifies the old name.

DO ANIMALS THINK?

The answer to this question depends entirely on what we mean by thinking. We should not say *think* when we mean *feel,* and we should not use the word thoughts to mean feeling. To think is really to put one thing and another together in our minds so as to make a link between them, and when the two things are linked together like this, that is a thought. To feel that you want your dinner is not to think, but to say to yourself "I am hungry" is a thought, because you have put together in your mind your idea of yourself and the idea you have of the feeling we call hunger.

So, if we use the word properly, the answer must be that animals can scarcely think at all, but that some of the higher animals, such as dogs, do, beyond a doubt, act sometimes in a way which can only possibly mean that they have somehow "put two and two together," and to do that is to think. The answer, then, is that some animals are capable, in a very small degree, of doing what we should certainly call thinking if they were men and not animals. Animals differ very much in this power to think.

WHY DID GRETNA GREEN BECOME FAMOUS?

Gretna Green is a village in Dumfriesshire, near the little river Sark that divides England from Scotland. In 1770 an act was passed in England making hasty marriages more difficult. It soon became the custom for runaway couples who wished to get married quickly to cross the border to Gretna, where they could be married under Scottish law. Before the marriage laws were altered, in 1856, many runaway marriages took place in the smithy there.

ARE ALL ANIMALS BLIND AT BIRTH?

It is not quite true that all animals are born blind, but it is true that most of the mammals, when they are newly born, do not at once begin to use their eyes. The eyes themselves are there, however, fully developed and ready to be used for seeing as soon as they have become accustomed to the strong light. The young of wild animals are born in a nest selected by the mother. This is generally placed in some dark and secluded place to which very little light gains access. The young animals can open and shut their eyes in their dim home. When they begin to move and gradually come into light, the eyes also gradually become used to that light, so that they are perfectly able to see at the time they require their sight.

WHY HAS A FRENCH NAIL GROOVES AT THE TOP?

The grooves enable the nail to grip firmly the wood into which it is driven. A nail smooth all the way down might hold tightly at first, but any vibration of strain, constantly repeated, would soon loosen it, as there would be little friction between the smooth nail and the wood in contact with it. It is friction that enables a nail to hold two pieces of wood together. The grooves give the nail something of the properties of a screw, though of course in the screw the grooves are very much more pronounced.

CAN WE MAKE THE TIDES WORK FOR US?

For a very long time men have been trying to find some way of making use of the rising and falling of the sea in the daily tides. It is possible to use the tides only where the difference in the level at high and low water is very great, as is the case on the southwest coast of England, the northwest coast of France, on the North German coast, and on the eastern coast of the United States.

In England, at the mouth of the Severn River the difference between high and low water at the spring tides, when sun and moon are pulling together in the same direction, is 42 feet, and at the neap tides, when sun and moon are opposing one another, 21 feet. This was the spot suggested for the first experiment in the harnessing of the tides. The scheme for harnessing the power of the tides in the Severn Estuary includes a great dam built across the mouth of the river, with a channel and locks for the passage of ships. Sluice-doors would admit the water when the tide was rising. At the turn of the tide the doors would be closed in order to imprison the water above the dam. Then this would be let out gradually, working turbines as it ran away. When more power was being produced than was needed, this would be used to pump up water to a still higher level, where it would remain till more power was wanted than was being produced. Then this water would be let out to work additional turbines. In this way the great problem of storing power would be solved economically. The power produced by this harnessing of the tides in the Severn would, it is believed, save three or four million tons of coal a year, and the expense would be about $150,000,000.

At Rockland, Maine, there is a 5,000 horse-power electric plant which uses tidal water for compressing air. This then serves instead of steam to drive an engine. In the Bay of Fundy, between Nova Scotia and New Brunswick, the tidal rise is almost 40 feet. Engineers say that by building a three-mile sea-wall across a narrow gap electric power a hundred times greater than that from Niagara could be obtained.

WAS THERE EVER A LIVING BIRD CALLED THE PHŒNIX?

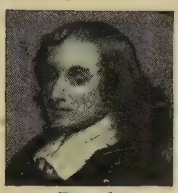
The phœnix was a fabulous bird of the ancient world. It was peculiarly known for its extraordinary beauty and for being the only living bird of its kind. It was said that when the phœnix felt death approaching, it built a funeral pyre of branches, set it on fire, and lay on the bed waiting for the flames to consume its body. But another phœnix always rose out of the ashes. According to one account, of doubtful accuracy, the Egyptians made a god of the phœnix, which symbolized to them the immortality of the soul. In fact, they believed that directly after death a new being was formed. This they called the twin of the lost personality. It was thought that this invisibly assumed the shape and features of the dead. This new being was supposed to inhabit the tomb. The Egyptians put in the grave not only food, but familiar things without which the sleeper would be unhappy on waking. Sometimes model boats were included.

THE NEXT WONDER QUESTIONS ARE ON PAGE 6691.

Descartes.

Balzac.

Montaigne.


Pascal.

Rousseau.

Voltaire.

Victor Hugo.

Molière.

Alexandre Dumas.

P. Corneille.

THE LITERATURE OF FRANCE

PART I

CONTINUED FROM 6415

THERE was once a robber who said his prayers every time he set out to rob people. One day he was caught and sentenced to death. But he did not die on the gibbet, for a patron saint who had heard his prayers descended from heaven and held him up with her white hands, so that he was taken down and received a full pardon.

With such tales as this, told in simple rhyme, French literature began its march through European history. Little songs, as full of foolish superstition as they were tender and gentle in feeling, are the first utterances of the French tongue. We read of an acrobat who repented of his sins and entered a monastery, but could not say the Lord's Prayer and did not know the Creed, and who could express his wish for heaven only by tumbling about as an acrobat in front of the altar dedicated to St. Mary. One day he fell down exhausted by these contortions, and his fellow-monks who were looking on saw St. Mary come to him and wipe away the perspiration from his forehead.

In such pleasant little tales we see the heart of France at the dawn of her history. She was a pagan country beginning to feel the wonder and beauty of another religion. Her peasants, living in dark huts surrounded by wild beasts, were simple people ready to believe anything they were told, and glad to believe anything which promised them a glorious reward for their lives of hardship and fear.

The mother found nothing absurd in singing to her children the song of a nun who ran away from her convent, lived a very wicked life, and, repenting at last, returned to the convent to find that her absence had not been noticed because St. Mary had come down from heaven and taken her place in the little cell. Nor did the father see anything incredible in the tale of a repentant knight who was ordered to fill a hermit's cask with water from a stream, and failed for a whole year, till one day a tear of true penitence fell from his eye and instantly filled the cask with water.

Songs of this nature and miraculous lives of saints were known from one end of France to the other in the Middle Ages. Almost simultaneously came songs in honor of great national heroes. The threat of Islam was a terrible fear to the French, and when Charlemagne arose to meet that threat as the unconquered champion of Christ, he became the inspiration of numerous songs and tales. How

splendid were some of those songs, and how exquisite the influence of Christianity, may be seen in the famous *Chanson de Roland* (Song of Roland).

In seven years' fighting Charlemagne had conquered the Saracens in Spain, and at last only one stronghold was left, that of Marsile of Saragossa. This king resolved to rid Spain of Charlemagne by treachery. He promised that if the Franks would go home, he and his Saracens would follow and be baptized at Aix. The Franks joyfully prepared to leave, and soon the mighty army was ready to set off through the narrow defiles of the Pyrenees. It only remained to decide who should guard the rear, and a treacherous knight, Ganelon, suggested that Roland, the emperor's nephew and the idol of the army, should be given this important charge. Roland eagerly accepted the responsibility.

Slowly the great army moved through the mountains, and last of all the rear guard of twenty thousand men entered the narrow Pass of Roncesvalles. With them were the famous Twelve Peers of France. A confused noise caused them to look back, and they saw all the country toward Spain glittering with steel like a moonlit sea. The Saracens were advancing upon them. Roland would not sound his olifant for help, but prepared to fight them to the death. After a dreadful battle, reinforcements of the enemy still came on, and at last Roland sounded his horn three times and, far away, Charlemagne heard the faint sound echoing and at once divined treachery. He called his captains and thundered back through the pass, but he came too late. He found all the Franks strewn upon the field and Roland lying upon his sword, his face toward the enemy.

The poem continues:

When Roland fell at Roncesvalles
The last man on the field was he;
He stumbled to a little hill
And laid him down beneath a tree.

On one side lay his lovely France
He had not seen for seven years;
And thence, too late, the Franks would ride
With swords as useless as their tears.

When Charlemagne reached that silent field
And wandered there in direst pain,
He found the good knight Roland dead,
And lo, his face was turned to Spain.

Throughout all these songs and tales wonder knows no bounds. Miracles almost cease to be miracles because they are forever happening. The simple and pious people of the eleventh century, looking back to the heroes of their national past, could believe anything. It flattered them and made them feel secure to think that angels had walked on French soil and had gone with French soldiers into battle against the Saracens, and that God had Himself ministered to the heroes of the Christian legions.

THE OLD, OLD TALES THAT GAVE WAY TO SONGS OF GREECE AND ROME

A little later a number of poems were written around King Arthur and his knights. In these the knights approach nearer the modern ideal. They are courteous and strive after a high ideal, as in the story of the Pursuit of the Holy Grail. We know these knights better than those of Charlemagne, for we have them in English in Sir Thomas Malory's Morte d'Arthur, and in Tennyson's Idylls of the King. Lastly, in the twelfth century, the people of France were listening to songs about the heroes of Greece and Rome. Here, too, the appetite for wonder was liberally satisfied by the singers; and whether the people were hearing about Julius Cæsar or Alexander, about Hector or Æneas, they were always in a world of magic and miracle, where adventures took away the breath and whetted the imagination for more impossible prodigies. Literature was still a fairy tale.

By this time France was responding to the happiness of a securer civilization. The Church was a great power. Architecture became splendid, the arts were reaching a higher standard, and life was kindly. So we find the literature of France turning to love songs—songs which were set to dancing measures; and we see the great feast days of the year, particularly the feasts of springtime, bringing out the troubadours and the minstrels, and the people singing and dancing in the open air.

We give one of the songs of Charles of Orleans, who wrote, it is true, a little later (1415), but his poetry is in the same manner:

Hence away, anxious folly!
Care, depart, and melancholy!
Think ye all my life to measure
Like the past, at your good pleasure?

That, at least, ye shall not do;
Reason shall be lord o'er you.
Hence away, then, anxious folly!
Care, depart, and melancholy!

Should ye e'er return again
Hither with your gloomy train,
Cursed of all the gods be ye,
And the hour ye come to me!
Hence away, anxious folly,
Care and boding melancholy!

THE SPIRIT OF HUMOR THAT CAME INTO THE LITERATURE OF FRANCE

Then wit made its appearance. In the twelfth century all France was laughing over the cunning and the discomfitures of Reynard the Fox.

Le Roman de Renart (The Tale of Reynard) is a great beast-epic, whose authorship is uncertain. We give you here a short excerpt:

The lion, king of beasts, decided to celebrate the Feast of Pentecost by keeping open court at his great palace of Sander with all triumphant ceremony and magnificence. He therefore summoned all manner of beasts to resort to the celebration. All came, in infinite numbers, with the exception of Reynard the Fox who, conscious of many transgressions against the lives and property of other beasts, was afraid to put his life in jeopardy.

There were few beasts who had not some complaints to make against the absent fox. Isegrim, the wolf; the little hound Curtise; Tibert, the cat; and the panther. His nephew Grimbard, the badger, defended him, but as he finished they perceived coming down the hill toward them stout Chanticleer, the cock, who brought upon a bier a dead hen whose head Reynard had bitten clean off, and it was brought before the king to take cognizance thereof.

Chanticleer, marching foremost, hung his wings and smote his feathers piteously, whilst on the other side the bier went two of his fairest hens, the fairest between Holland and Arden. Each of them bore a straight bright burning taper, for they were sisters to Coppel that lay dead upon the bier; and as they marched they cried, "Alack, alack! and well-a-day! for the death of Coppel, our sister dear." Two young pullets bore the bier, and cackled so heavily and wept so loud for the death of Coppel, their mother, that the very hills echoed to their clamor. On reaching the presence of the king, Chanticleer, kneeling down, spake as follows:

"Most merciful, dread lord, the king! vouchsafe, I do beseech you, to bear and redress the injuries which the fox Reynard hath done me and my children, whom you here behold weeping, as well they may. For it was in the beginning of April, when the weather was fair, I being then in the height of my pride and plumage, sprung from great stock and lineage, with eight valiant sons and seven fair daughters by my side, all of whom my wife had brought me at a single hatch, all of whom were strong and fat, strutting in a yard well fenced round about. Here they had several sheds, besides six stout mastiff dogs for their guard, which had torn the skins of many wild beasts; so that my children felt secure from any evil that might happen to those more exposed to the snares of the world; but Reynard, that false and dissembling traitor, envying their happy fortune, many times assailed the walls in such desperate manner, that the dogs were obliged to be loosed, and they hunted him away. Once, indeed, they overtook and bit him, making him pay the price of his theft, as his torn skin bore witness. Nevertheless he escaped, the more the pity.

"But we lived more quietly some time after; until at last he came in the likeness of a hermit, and brought me a letter to read. It was sealed with your majesty's royal seal; and in it I found written that you had proclaimed peace throughout all your realm, and that no manner of beasts or fowl were longer to injure one another. Reynard affirmed that, for his own part, he was become a monk, a cloistered recluse, and had vowed to perform daily penance for his sins. He next showed me and counted his beads; he had his books and wore a hair shirt next to his skin, while in a very humble tone he said, 'You see, Sir Chanticleer, you have never need to be afraid of me henceforward for I have vowed ne'ermore to eat flesh. I am now waxed old, and would only remember my soul; I have yet my noon and my evening prayers to say: I must therefore take my leave.'

"He departed singing his credo as he went, and I saw him lie down under a hawthorn. These tidings made me exceedingly glad; I took no further heed, but chuckling my family together, I went to ramble outside the wall, a step I shall forever rue. For that same devout Reynard, lying under the bush, came creeping between us and the gate; then suddenly surprised one of my children, which he thrust into his maw, and to my great sorrow bore away. For having tasted the sweetness of our flesh, neither hunter nor hound can protect us from him. Night and day he continues to watch us with such hungry assiduity, that out of fifteen children he hath now left me only four unslain. Yesterday, my daughter Coppel—here lying dead upon her bier, her body being rescued by the arrival of a pack of hounds, too late alas!—hath fallen, after her mother, a victim to his arts. This is my just complaint, which I refer to your highness's mercy to have compassion upon, and upon my many slaughtered children."

Then spake the king: "Sir Grimbard, hear you this of your uncle, the recluse? He seems to have feasted and prayed with a vengeance; but if I live another year he shall dearly abide it. For you, Chanticleer, your complaint is heard, and shall be repaired. We will bestow handsome obsequies upon your daughter dead, laying her in the earth with solemn dirge and worship due. This done, we will consult with our lords how to do you right, and bring the murderer to justice."

Æsop came into fashion, and all the beasts, birds, fishes and foolish men of the world were dragged into a literature which was half comic and half moral. These are the famous *fabliaux* of France. The priests and the monks tried to keep this lively spirit within the bounds of useful parable; but, unfortunately, the lives of the monks were not always very inspiring, and soon French literature was holding up drunken and lazy monks to the laughter of the French people.

There was also at this time a reaction among the burghers of the towns, the soldiers and the peasants against the beautiful and stately and romantic tales of love. French wit broke away from that atmosphere to laugh at love, to hold women up to scorn, to make fun of everything tender, gracious and true. The singers who went about the country telling these sordid tales were themselves a very low lot of men, and it was not long before decent people tired of them; and when great lords employed educated singers to compose songs for their enjoyment, literature once more found expression in romance.

In the thirteenth century was composed a famous poem called *Le Roman de la rose* (The Romance of the Rose), in which love is presented as something noble and beautiful.

THE FIRST FRENCH HISTORIANS AND THEIR WORK

The first really remarkable French author who used prose to write a history is Geoffroi de Villehardouin, marshal of Champagne, who died in 1212. Under the title of *La Conquête de Constantinople* (The Conquest of Constantinople), Villehardouin has left us a history of the Fourth Crusade, which is the best account of feudal chivalry that we possess. A little later came Joinville's *L'Histoire de Saint Louis* (The History of St. Louis), which celebrates the virtues of the great French king who fought for six years in the Crusades.

Here we read a little from his chronicle concerning the character of his king:

> This holy man, King St. Louis, loved and feared God during his life above all things, and, as is very apparent, was in consequence favored in all his works. As I have before said that our God died for his people, so in like manner did St. Louis several times risk his life and incur the greatest dangers for the people of his realm, as shall be touched on hereafter.
>
> The good king, being once dangerously ill at Fontainebleau, said to my lord Louis, his eldest son, "Fair son, I beseech thee to make thyself beloved by the people of thy kingdom; for, in truth, I should like better that a Scotchman, fresh from Scotland, or from any other distant and unknown country, should govern the subjects of my realm well and loyally, than that thou shouldst rule them wickedly and reproachfully."
>
> The holy king loved truth so much, that even to the Saracens and infidels, although they were his enemies, he would never lie, nor break his word in anything he had promised them, as shall be noticed hereafter. With regard to his food, he was extremely temperate; for I never in my whole life heard him express a wish for any delicacies in eating or drinking, like too many rich men; but he sat and took patiently whatever was set before him.
>
> In his conversation he was remarkably chaste; for I never heard him at any time utter an indecent word, nor make use of the devil's name, which, however, is now very commonly uttered by every one, but which I firmly believe is so far from being agreeable to God, that it is highly displeasing to Him.

After this work by Joinville, who was the Boswell of Louis, we get the glowing pages of Froissart in the fourteenth century, a work of enormous interest—but still only a surface view of society, and chiefly a surface view of royal courts with an occasional battle. We give you below a short example of his manner as he writes of the battle of Otterbourne, which took place in England in 1388.

> The Scots were supping, and some indeed asleep, when the English arrived, and mistook, at the entrance, the huts of the servants for those of their masters; they forced their way into the camp, which was tolerably strong, shouting out, "Percy, Percy!" In such cases, you may suppose, an alarm is soon given, and it was fortunate for the Scots the English had made the first attack upon the servants' quarters, which checked them some little. The Scots, expecting the English, had prepared accordingly; for while the lords were arming themselves, they ordered a body of the infantry to join their servants and keep up the skirmish. As their men were armed, they formed themselves under the pennons of the three principal barons, who each had his particular appointment.
>
> In the meantime the night advanced; but it was sufficiently light for them to see what they were doing, for the moon shone, and it was the month of August, when the weather is temperate and serene. When the Scots were properly arrayed, they left the camp in silence, but did not march to meet the English. During the preceding day they had well examined the country, and settled their plans beforehand, which, indeed, was the saving of them. The English had soon over-

powered the servants; but as they advanced into the camp they found fresh bodies of men ready to oppose them and to continue the fight. The Scots, in the meantime, marched along the mountain side, and fell on the enemy's flank quite unexpectedly, shouting their war cries. This was a great surprise to the English, who, however, formed themselves in better order and reinforced that part of the army.

And indeed the famous history of Froissart is a landmark in French literature, for it establishes a break with fairy tale and parable; it will probably continue to be consulted for many years to come, in spite of its shallowness and falsity.

THE BOOKS THAT SHOW HOW FRENCH LITERATURE BROKE WITH ITS PAST

In the fifteenth century a much more serious figure appears—Philippe de Comines, who has been called "the last chronicler of the Middle Ages and the first of modern historians." He led a strange life. An orphan in boyhood, badly educated even in those days, he nevertheless got into the service of Charles the Bold, whom he deserted for Louis XI.

It was a just desertion. Charles was a bullying buccaneer; Louis was a wise and careful statesman. But with the death of Louis, Comines paid the penalty for his treachery. For eight months he lay doubled up in an iron cage, and, released from this cruel torture, he was flung into prison, and there he remained for two years. But in the end things came right for him, and he wrote his *Mémoires*. Those pages are of great value to the historian, for they show us how French literature turned away from the romance and superstition of its past, turned away also from the mere superficial glitter of Froissart, and looked steadily at the facts and realities of human life. De Comines is writing of the state of mind into which King Louis brought himself before his death. He had imprisoned many of his enemies, and indeed invented for them special tortures:

> . . . so before he died he himself was in greater torment, and more terrible apprehension than those whom he had imprisoned; which I look upon as a great mercy towards him, and as part of his purgatory; and I have mentioned it here to show that there is no person, of what station or dignity soever, but suffers some time or other, either publicly or privately, especially if he has caused other people to suffer. The king, towards the latter end of his days, caused his castle of Plessis-les-Tours to be encompassed with great bars of iron in the form of thick grating, and at the four corners of the house four sparrow nests of iron, strong, massy, and thick, were built. The grates were without the wall on the other side of the ditch, and sank to the bottom. Several spikes of iron were fastened into the wall, set as thick by one another as was possible, and each furnished with three or four points. He likewise placed ten bowmen in the ditches, to shoot at any man that durst approach the castle before the opening of the gates; and he ordered they should lie in the ditches, but retire to the sparrow nests upon occasion. He was sensible enough that this fortification was too weak to keep out an army, or any great body of men, but he had no fear of such an attack; his great apprehension was that some of the nobility of his kingdom, having intelligence within, might attempt to make themselves masters of the castle by night, and having possessed themselves of it, partly by favor, and partly by force, might deprive him of the regal authority, and take upon themselves the administration of public affairs, upon pretense he was incapable of business, and no longer fit to govern.
>
> The gate of the Plessis was never opened, nor the drawbridge let down, before eight o'clock in the morning, at which time the officers were let in: and the captains ordered their guards to their several posts, with pickets of archers in the middle of the court, as in town upon the frontier that is closely guarded: nor was any person admitted to enter except by the wicket and with the king's knowledge, unless it were the steward of his household, and such persons as were not admitted into the royal presence.

There lived at the same time as this historian a sad scamp, who was nevertheless a genius. His name was François Villon. In spite of many crimes, and a life of unbroken vagabondage, Villon sang songs which haunt us to the present day, and made a far more definite break with the literature of the past than the *Mémoires* of Comines. These songs were tremendously real. They came straight from a human heart, and a heart that had suffered; but Villon's heart had learned to laugh through its suffering, and to turn all its tears into music. He teaches us nothing; but he stands forever as a landmark in literature, and there will always be people to love his utterance because it is so poignantly true.

This is a ballad of his written in prison:

> Clerks, that go caroling the livelong day,
> Scant pursued, but glad and frank and full of glee;

Wandering at will along the broad highway,
Hairbrained, perchance, but wit-whole too, per die;
Lo! now, I die, whilst that you absent be.

Song singers, when poor Villon's days are told,
You will sing songs for him and candles hold;
Here light nor air nor living enters not,
Where ramparts thick are round about him rolled;
Will you all leave poor Villon here to rot?

A POOR MONK AND THE WORLD OF TRUTH THAT HE DISCOVERED

But a greater figure was to come. At the end of the fifteenth century was born

François Rabelais, son of humble parents, educated in a village school, and for fifteen years a Franciscan monk. Strange is it to think that this obscure man, who was buried in a convent for so many years, should burst those prison walls of the human soul and emerge into history as the most prodigious figure of the French Renaissance. He towers up like a Goliath of culture. He overtops all other men of his country. His voice reaches to the ends of the earth. It is the voice of life awaking from the sleep of the Middle Ages.

Rabelais found his way to literature and science while he was yet a monk. A new world swam into his ken—the world of books. He became its Francis Drake and Walter Raleigh. All knowledge attracted him, but chiefly mathematics, astronomy and medicine. He was suffocated by the superstitions of the convent. He could breathe freely only in this new world of truth. So he broke away from the Church, and, turning on it with a fury which was stronger for the mirth of happiness in his huge and tempestuous heart, set about its destruction by wit, satire and irony.

He was essentially a good man, even a religious man, but he saw the Church of that time as the enemy of truth, and hated it furiously. We cannot now read his tales with any pleasure. They are gross, horrible and vile. Much of the wit has no meaning for us; the humor belongs to an age which had little or no sense of refinement. But those works witness, all the same, a new birth of the human spirit, and his heroes, Gargantua and Pantagruel, from his extravaganza *L'Histoire de Gargantua et de Pantagruel* (The Story of Gargantua and Pantagruel), are immortal. Rabelais believed in God and in immortality; but he believed in living merrily and in strengthening the reason to resist sentimental weakness and folly.

THE TWO FORCES STRIVING FOR THE MASTERY OF MAN'S SOUL

Vastly different from this giant of intellectual riot was his contemporary Jean Calvin, one of the greatest French writers of the sixteenth century. He was born in Picardy in 1509 and died in Geneva in 1564. He studied theology in Paris, and became an avowed friend of the Reformation. He began preaching in Paris, but was banished for his bold attacks on Romanism. He took refuge at Geneva and there spent the remainder of his life. Rabelais asserted that human nature was a good thing; Calvin proclaimed with matchless force and a piercing logic that it was essentially vile. The two men were at daggers' points and they represent for us the two forces striving in the Renaissance for the mastery of man's soul. To Rabelais, God was a genial and universal Providence; to Calvin, He was the august and terrible Potentate, electing some of His creatures to eternal bliss, but most to everlasting punishment. Rabelais is no longer taken seriously; but to this day Calvin is regarded as one of the greatest intellects. His writings, as literature,

are a noble triumph. His chief work, which has been translated into nearly all the European languages, is *L'Institution chrétienne* (The Institutes of the Christian Religion).

The poet who first sounded the note of the new poetry which flourished in the sixteenth century in France was Clément Marot, whose poems and epistles were remarkable for their style and wit and elegance. Around Marot rose a whole school of imitators. He was born at Cahors in 1496, the son of the court poet to Anne of Brittany, and by him carefully instructed. He accompanied Francis I on his Italian campaign, and was wounded and taken prisoner with him at Pavia. Twenty years of intermittent but steadily growing misfortunes follow. His pen was caustic against the corruption of the clergy of the day, and so he was hated and hunted as a heretic. He was imprisoned and banished—forced to fly, now to Switzerland, now to Italy. Nevertheless, misfortune did not dim his courage. His letters in verse are delightful: light, easy, conversational. His ballades, rondeaux, elegies are brimful of art and charm, though abounding in quaint mannerisms and words.

A little later Ronsard and six other writers composed the famous "Pléiade," whose object was to bring the French language on a level with the classical tongues by borrowing from the latter. They recalled French literature from the battlefields of theology to the pretty garden of courtly love. Thus a school of poets came into being who loved literature for its own sake, and were satisfied with verbal cleverness, charming images and ingenious conceits. There was a revival of classic tragedy, much talk of "schools," and a great deal more imitation of antiquity than original work.

Ronsard is one of the greatest of French lyric poets. Unlike most of his fellow-poets, his life was peaceful, happy and prosperous. Henry II and Francis II covered him with honors and pensions; Charles IX added priories and abbacies, and Queen Elizabeth presented him with a set of diamonds. His works comprise odes, hymns, *amours, La Franciade* (an unfinished epic), sonnets and elegies. He was born near Vendôme in 1524, and died in Touraine in 1585.

We give you here just one little instance of his fine lyric power:

THE ROSE

See, Mignonne! hath not the rose,
That this morning did unclose
Her purple mantle to the light,
Lost, before the day be dead,
The glory of her raiment red,
Her color, bright as yours is bright?

Ah, Mignonne! in how few hours
The petals of her purple flowers
All have faded, fallen, died!
Sad Nature! mother ruinous!
That seest thy fair child perish thus
'Twixt matin song and eventide.

Hear me, Darling; speaking sooth:
Gather the fleet flower of your youth!
Take ye your pleasure at the best!
Be merry ere your beauty flit!
For length of days will tarnish it,
Like roses that were loveliest.

While these things were going on there was born in a château in Périgord in the year 1533 a man named Montaigne, who had three great passions in his life—love for his father, love for a friend named La Boétie and love for study. He lived a very quiet and beautiful life, and devoted all his studies to an understanding of human nature. "What do we really know?" was his most insistent question; and the answer, which he delivered to mankind in a series of the most delightful and scholarly essays, was: "Very little." He was a Socrates of the French Renaissance. He had little faith in the power of intellect. He had a great admiration for character. He taught men not to worry, not to get into a fuss about things, but to live with resignation, enjoying the spectacle of an existence which must always be sad but need never be without amusement.

Montaigne's *Essais* (Essays), published 1580–88, had an immense influence on French authors of the seventeenth and eighteenth centuries, and have been widely read outside of France. Shakespeare and Ben Jonson possessed English translations. We give you here a short excerpt from one on the Virtues of the Lower Animals.

What is there in us that we do not see in the operations of animals? The swallows that we see at the return of the spring, searching all the corners of our houses for the most commodious places wherein to build their nests; do they seek without judgment, and amongst a thousand choose out the most proper for their purposes, without discretion? And in that elegant and admirable contexture of their buildings, can birds rather make choice of a square figure than a round, of an obtuse than of a right angle, without knowing their properties and effects?

THE NEXT STORY OF LITERATURE IS ON PAGE 6711.

FRENCH—A DOLL AND A QUARREL

First line, French; second line, English word; third line, as we say it in English.

Il y avait une fois une petite fille qui avait une belle poupée.
There was a time a little girl who had a beautiful doll.
Once upon a time there was a little girl who had a beautiful doll.

Cette petite fille avait un frère, et ils jouaient ensemble toute la journée.
This little girl had a brother, and they played together all the day.
This little girl had a brother, and they used to play together all day.

Un jour ils se querellèrent. "Je casserai votre poupée," s'écria le garçon.
One day they quarreled. *"I will break your doll," himself cried the boy.*
One day they quarreled. "I will break your doll!" cried the boy.

La petite fille fondit en larmes, et elle berça la poupée dans ses bras.
The little girl burst in tears, and she rocked the doll in her arms.
The little girl burst into tears, and rocked the doll in her arms.

"Si vous blessez ma poupée je ne vous parlerai plus jamais," dit-elle.
"If you hurt my doll I (not) to you will speak more never," said she.
"If you hurt my doll I will never speak to you again," said she.

Le matin la petite fille courut à la chambre des enfants.
The morning the little girl ran to the room of children.
In the morning the little girl ran to the nursery.

Elle alla au berceau, mais il était vide. La poupée était partie!
She went to the cradle, but it was empty. *The doll was departed!*
She went to the cradle, but it was empty. The doll was gone!

"Ce mauvais garçon l'a prise," s'écria-t-elle, frappant du pied.
"That bad boy her has taken," herself cried she, stamping of the foot.
"That bad boy has taken it," she cried, stamping her foot.

Tout à l'heure le chien bondit dans la chambre portant la poupée.
All at the hour the dog bounded into the room carrying the doll.
Presently the dog bounded into the room carrying the doll.

"Le méchant!" s'écria la petite fille. "Je regrette de m'être mise en colère."
"The naughty!" herself cried the little girl. *"I am sorry of me to be put in anger."*
"Bad dog!" cried the little girl. "I am sorry I was angry."

THE NEXT FRENCH STORY IS ON PAGE 6840.

The rose Pogonia, a beautiful orthid.

FLOWERS OF NORTH AMERICA

FLOWERS OF THE EAST: PART II

CONTINUED FROM 6282

THE lovely Arethusa, or Indian Pink, another Orchid, is common in marshes in June. The flower is rose-purple and large, with a bearded lip. The one-flowered stem grows from a globular bulb, and is sheathed at its base by a solitary linear leaf hidden in the sheaths of the stem and protruding after flowering. Burroughs writes: "Arethusa was one of the nymphs who attended Diana, and was by that goddess turned into a fountain that she might escape the god of the river Alpheus, who became desperately in love with her on seeing her at the bath." Our Arethusa is one of the prettiest of the Orchids, and has been pursued through many a marsh and quaking-bog by her lovers. She is a bright pink-purple flower an inch or more long, with the odor of sweet violets.

Sweet Pogonia is another rare but beautiful Orchid. It has rosy blossoms and a perfume suggesting ripe red raspberries. The stem is about eight inches high and bears a single ovate or lance-shaped leaf near the middle, and a solitary flower at the summit.

The beautiful Calopogon, or Grass Pink, is a lovely Orchid, with a loose raceme of four to twelve delicate pink flowers in a loose cluster at the top of a scape six to twelve inches high. The flowers seem to be upside down, as the tip is at the top. A single grass-like leaf sheathes the stem near its base, as it rises from a solid bulb. This exquisite flower raises its graceful head only in deep, wet swamps and bogs, where it can be reached only with some effort and difficulty.

The Purple Fringed Orchid is found in wet meadows in early June. A smaller species appears in July. The lower leaves are oval or oblong, passing into lance-shaped bracts above. The flowers are purple, rather large, and grow in a spike. Each flower has a fan-shaped three-parted lip with fringed divisions, and a long curving spur. Under date of June 9 Thoreau writes: "Find the great fringed orchid out apparently two or three days—a large spike of peculiarly delicate, pale purple flowers growing in the luxuriant and shady swamp—the village belle never sees this more delicate belle of the swamp—only the skunk or owl or other inhabitants of the swamp behold it."

THE MONUMENT CHOSEN FOR THE BOTANIST LINNÆUS

The Twin-flower belongs to the Honeysuckle Family.

. . . Beneath dim aisles, in odorous beds,
The slight Linnæa hangs its twin-born heads.

It has a slender, creeping and trailing stem, and rounded evergreen leaves. The delicate pink fragrant flowers grow in pairs, nodding on thread-like upright flower-stems. The calyx is five-toothed, and the corolla bell-shaped and five-lobed, and hairy within. The delicious perfume of the nodding pink flowers fills the air and draws one to their home in the cool moss of the woods. This flower was selected as a monument to the great Linnæus and named *Linnæa borealis*. The American Twin-flower is considered another species by some botanists.

Another pretty flower of June woods is Bunch-berry, or Dwarf Cornel. It has a stem from five to seven inches high, and ovate pointed leaves, which are crowded into a whorl of from four to six. At first sight the flowers appear like a single white blossom, but on closer inspection it is found that what appeared like white round petals are really the white leaves of the involucre which surrounds a cluster or head of small greenish flowers. The fruit is bright red and berry-like, and lends beauty to the woods and swamps in late summer. They are edible, and form part of the winter food of denizens of the northern woods of Canada.

Born in the purple, born to joy and pleasance,
Thou dost not toil or spin,
But makest glad and radiant with thy presence
The meadow and the lin.

THE REGAL FLEUR-DE-LIS, THE FLOWER OF CHIVALRY

The Large Blue Flag, or Fleur-de-lis, is beautiful in form and color. The Fleur-de-lis, the "flower of chivalry" chosen by Louis VII as his badge, was the White Iris, which is even more regal and beautiful than the blue species. The latter species has a solitary flower from a green spathe, at the end of a long stem. The flower is large and showy, violet-blue, variegated with green, yellow or white, and purple-veined. The perianth consists of three outer recurved divisions, and three inner smaller and erect parts. The three stamens are covered by the three overarching petal-like divisions of the style. The foliage leaves are flat and sword-shaped, green, and are folded into flat clusters at the base. The stem is one to three feet high, stout, angled on one side, and leafy. It abounds in wet meadows and ditches, and the flowers appear in June. The Blue Flag flower possesses a special interest to the botanist because it is an example of a flower which has guarded itself against self-fertilization. The divisions of the style overarch the stamens, and this arrangement effectually prevents self-pollination. Bees carry pollen from one flower to another. It is said that bees like blue flowers. The insect lights on one of the recurving sepals, and, guided by the conspicuous veins, thrusts his head and back beneath a branch of the style and sips the honey at the base of the stamens. The pollen is sifted on his back. In withdrawing he leaves the stigma of that flower untouched, but the projecting lip of the stigma of the next flower visited scrapes his back and thus secures the needed pollen.

The Blue-eyed Grass blossoms in June, and belongs to the Iris Family. The plant is about one foot high, with narrow grass-like leaves, and small blue flowers with a yellow centre. The flowers open in the morning but close later in the day. It is common in meadows from the Atlantic to the Pacific Ocean.

ANOTHER PURPLE FLOWER

The Fringed Polygala is a delicate and lovely flower blossoming in early June. It prefers a sandy soil in rich woods and is found in eastern and middle Canada. The stem is three or four inches high, from long prostrate or underground stems. The upper leaves are green, ovate and crowded at the summit; the lower leaves are scattered and scale-like. The whole plant has a fresh and tender aspect. It has large showy purplish flowers, rarely white, with corollas which are conspicuously fringed and crested. In addition to these showy blossoms the plant bears small hidden flowers on its underground stems—"one playful flower for the world, another for serious use and posterity."

In June woods the much-divided leaf and rounded flower-clusters of Wild Sarsaparilla are often seen, and later in the year the dark berries are noticeable. The stem bears a single large long-petioled much-divided leaf, and a shorter naked

FLOWERS OF WOOD AND STREAM

This is the dainty flower of the Wood Sorrel, improperly called the shamrock. The flowers are white, red-veined and often tinged with purple.

Several Orchids are found in northern woods. The Showy Orchid, shown here, blooms in May. One petal is a platform on which bees alight.

Pickerel Weed is so called because it grows in shallow waters where pickerel may be found. Its blue flowers, which form a close spike round the stem, bloom from July to September.

Indian Pipes have no green foliage, as the plants always grow on decaying vegetable matter. The bracts which grow from the stems take the place of leaves. The flowers get their name from their shape.

scape which bears the rounded flower-cluster of small greenish white flowers. The long roots are fragant and aromatic, and are often sold as a substitute for genuine Sarsaparilla.

THE GERANIUMS OF THE WOODS

Wild Geranium is a common woodland plant flowering in early summer. The stem is erect and from one to two feet high, and the leaves are rough-hairy. The leaves are five-parted, with the divisions lobed and cut. The flowers are quite large, magenta or pale purple, and grow in clusters at the ends of the branches. The corolla is regular, with five petals. The calyx is hairy and has five sepals. The beak-like appearance of the fruit, which splits at maturity so elastically as to discharge the seeds to some distance, gives the common name Cranesbill. Geranium is the Greek word for "crane." Our cultivated geraniums are quite different.

Herb Robert is another geranium very similar to the last, but somewhat smaller. Its leaves are smaller and more deeply cleft, and the flowers are coarser in texture. The stem is usually stained with red, and both stem and leaves emit a strong odor when bruised.

THE SORREL, SOMETIMES CALLED THE SHAMROCK

Wood Sorrel belongs to the same family. The name Sorrel comes from the word "sour," and has reference to the acrid juice of sorrels. The White Wood Sorrel makes a dainty carpeting in June woods. The flowers are frail-looking, about one inch broad, with five white petals veined with red, and are solitary on little scapes from two to five inches high. The leaves are divided into three clover-like leaflets which "sleep" at night —that is, they droop and close one against another. The early Italian painters used it as a model. Ruskin says: "Fra Angelico's use of the *Oxalis acetosella* is as faithful in representation as touching in feeling. The triple leaf of the plant and white flower stained purple probably gave it strange typical interest among the Christian painters."

By many the three-parted leaf has been considered the shamrock of the ancient Irish, and these people think its leaf was used by St. Patrick in his endeavor to prove to his audience the possibility of a Trinity in unity. "Cuckoo meat" and "Cuckoo bread" are English names for the flower because it comes with the cuckoo; and the odd name "Alleluia," given it in Europe, recognizes its advent near the glad Easter season. The Yellow Wood Sorrel has fragrant bright golden yellow flowers. It is not really a woodland plant but is common along roadsides and in gardens and fields, from Nova Scotia to Manitoba. The stem is leafy and slender, and the flowers, which open only in the sunshine, are in few-flowered clusters at the end of the stem. After the flowering season little erect pointed pods take the place of the flowers.

FLOWERS THAT LIVE THROUGH THE YEAR

The Partridge Berry is an evergreen vine clothed with dark shining rounded green leaves, which are often veined with white. At all times of the year this pretty trailing vine, with its little evergreen leaves, adorns the moist woods and woodside banks in eastern Canada. The little cream-white flowers appear in June and July, and are succeeded later by bright red berries which, though nearly tasteless, are much liked by birds. The unmolested berries remain on until the following spring, when they may be found among the waxy flowers.

THE DAINTY LITTLE LEAVES OF THE WINTERGREEN

The Wintergreen, or Checkerberry, is a much-prized dainty little evergreen found in the cool shade of evergreen woods. The stem is from three to six inches high, slender and leafy at the summit. The leaves are oval, about one inch broad, sparingly toothed, shining green, evergreen and edible. The delicate little white flowers are urn-shaped, with the corolla five-toothed, and they usually hang in twos on slender peduncles, just beneath the spreading leaves. The flowers are delicate and pretty, with a background of shining leaves. The leaves have a pleasant aromatic flavor similar to that of sweet birch, and are sometimes used as a substitute for tea. The bright red berries are also edible and savory, and are relished by birds and deer during the winter.

TWO UNPLEASANT FLOWERS

The Indian Poke, or False Hellebore, is a plant which attracts attention in early spring and summer, not because of its dingy flowers, which appear in June, but because of its tall stems, from two to

The pretty little cream-white flowers of the Partridge Berry bloom in moist woods in June and July. They are followed by bright red berries.

We all know the attractive evergreen leaves and red berries of the Wintergreen, but not so many are familiar with its pretty white urn-shaped flowers.

Here we have the greenish white flowers of the Wild Sarsaparilla, which bloom in June. The root of the plant is sometimes sold as a substitute for the true sarsaparilla. The berries are dark.

This is the fruit of the Bunch-berry, which flowers in June. The flowers are small and greenish in color and surrounded by white leaves. They are followed by bright red berries, which birds eat.

seven feet high, clothed with many large broadly oval pointed, clasping leaves. The root is coarse, fibrous and poisonous. It grows in swampy woods and roadsides.

Somewhat similar in name, but quite different in form, is Indian Pipe, another dweller in deep woods. It is a low fleshy herb, from three to eight inches high, without green foliage, but with colorless bracts in the place of leaves.

In shining groups, each stem a pearly ray,
Weird flecks of light within the shadowed wood,
They dwell aloof, a spotless sisterhood.
No Angelus, except the wild bird's lay,
Awakes these forest nuns; yet, night and day
Their heads are bent, as if in prayerful mood.
A touch will mar their snow, and tempests rude
Defile; but in the mist fresh blossoms stray
From spirit-gardens, just beyond our ken.

The flower is white or pinkish, single, terminal and nodding—the bowl of the pipe. The plants spring from a ball of matted rootlets which derive their nourishment from decaying vegetable matter. The clammy touch of the plant, its wax-like whiteness in life, and its disposition to decompose and turn black when plucked and handled, make the name Corpse Plant seem singularly appropriate. The Indians counted it a healing plant and made an eye-lotion from it.

BEECHDROPS AND CUCUMBER-ROOT

Beechdrops or Cancer-root is another fleshy parasitic plant of northern woods. These curious-looking plants have slender branching fleshy stems, purplish or yellowish in color, without leaves but covered with small scales. The flowers are purplish or yellowish, small, and of two kinds, the upper sterile and the lower fertile. The Pine Sap, or False Beechdrops, is another parasitic plant very similar to the true Beechdrops, found from June to August in oak or pine woods. It is tawny, reddish or whitish. The flowers are clustered and fragrant.

The Indian Cucumber-root is found in deep woods, has a tuberous rootstock, which in shape and flavor resembles a cucumber, and was probably used as food by the Indians. The stem is slender, from one to three feet high, with leaves in two whorls, the lower whorl of from five to nine oblong pointed leaves set close to the stem, the upper whorl of three or four much smaller leaves. The flowers are greenish yellow, small, clustered, and set close to the upper leaves. In September the brilliant foliage and purple berries of the little plant attract attention.

Leaving the forest and approaching the bank of a fresh-water stream or shallow pond, one's attention is attracted by the blue closely spiked flowers of Pickerel-weed, which blossoms from July to September. The stem is stout and usually one-leaved. The leaf is arrow- or heart-shaped, and clasps the stem about midway, while others on long petioles grow from the rootstock. One may fish for pickerel in the shallow water where Pickerel-weed grows.

THE GORGEOUS FLAME BESIDE THE BROOK

I close this description of common Canadian wild flowers, most of which blossom in spring or early summer, by a reference to a later bloom, one of the most attractive of all.

As if some wounded eagle's breast,
Slow throbbing o'er the plain,
Had left its airy path impressed
With scarlet rain.

The early French Canadians were so impressed with the beauty of the Cardinal-flower that they sent the plant to France as a specimen of what the wilds of the New World could produce. In late summer its brilliant red gleams from marshes and moist ground along brooks, from Nova Scotia to Manitoba, and far down into the United States. The stem is from two to four feet high, and hollow. The leaves are alternate, narrowly oblong or lance-shaped, and closely set to the stem. The showy spike is loosely set with bright red flowers. The corolla is somewhat two-lipped, the upper lip of two erect lobes, the lower lip spreading and three-cleft. The flowers are frequently visited by and chiefly pollinated by the ruby-throated humming-bird. The English name likens it to the gorgeously attired dignitaries of the Roman Catholic Church.

During the late summer or early fall, if one comes upon a brook or a marsh glowing with this gorgeous flame, he can never forget the sight. No flower of the greenhouse or the garden can surpass these proud plants which swing in the breezes like moving flames among the green.

THE NEXT STORY OF PLANT LIFE IS ON PAGE 6655.

A GREAT ROMANCE OF ADVENTURE

ALEXANDER DUMAS, the celebrated romancer, who was largely inspired in his work by the example of the great Sir Walter Scott, based most of his famous stories on episodes from history. But he took great liberties with historical facts, and considered that the purposes of his tale were more important than the facts of history. Yet the greatest of his novels is one in which history plays practically no part at all. The Count of Monte Cristo is purely an effort of the imagination, and a more fascinating story was never conceived in the mind of a romancer. In its original form it is a work of enormous length, and takes one a great deal of time to read, though the time so spent is full of delight. Here we have endeavored to retell the story very briefly. Monte Cristo was originally published in 1844.

THE COUNT OF MONTE CRISTO

CONTINUED FROM 6121

THE three-masted ship Pharaon arrived at Marseilles from Smyrna commanded by the mate, young Edmond Dantès, for the captain had died on the voyage. Edmond was a great favorite with the crew, to whom he was more like a brother than a superior officer, and his skill in seamanship was so unquestioned that the shipowner did not hesitate to offer him the command. A captain at nineteen, his increase of pay would enable him to make his old father comfortable, and it would also enable him to marry at once the dark-eyed Mercédès, who had been his sweetheart for three years.

Little wonder, then, that when he had set foot in Marseilles there was not a happier man in all the city. He seemed to walk on air. His wedding was arranged, and the guests were invited to the feast. Everything was prospering so much with him that more than once he said his happiness was almost too great to last. Fulfilling the dying request of the captain, Dantès had called at the island of Elba, where Napoleon was then a prisoner. From the grand marshal he had received a letter which he promised to deliver in person to a gentleman in Paris. Unfortunately the young sailor had two enemies. One was Danglars, another sailor who was jealous of Dantès' promotion; the other was Fernand, a half-Spanish cousin of Mercédès, the girl to whom Dantès was engaged. Fernand wanted to marry Mercédès, and with Danglars schemed to get the innocent young captain out of the way.

They reported the call at Elba to Villefort, the deputy public prosecutor at Marseilles. Villefort had Dantès arrested and searched. On his person was found the letter he had promised to deliver in Paris. The contents dealt with plans for Napoleon's escape from Elba. Villefort, who realized that the missive was addressed to his own father, a supporter of Napoleon, had Dantès imprisoned in the terrible island fortress the Château d'If. The deputy prosecutor was afraid that he himself would be accused of treason if the facts were known, so he burned the letter. But he intended that Dantès should be kept in prison for life.

In a damp and dismal room, almost underground, Edmond lived for six years without seeing or speaking to anyone but his jailer. Hearing sounds as if some prisoner were trying to move one of the stones in the wall, the sailor thought that he, too, might try to escape. Finally, after working for months with very poor tools, Edmond moved a stone, to find a tunnel made by the prisoner whose work had inspired him. This man, the Abbé

Faria, had been imprisoned four years longer than had Edmond.

Previous to being transferred to the Château d'If he had suffered three years' imprisonment in another fortress. His crime had been to advocate a united Italy and to scheme for the making of a powerful kingdom out of the petty principalities into which his native land was divided at that time. This was treason to Napoleon's plans in 1807, and the abbé had been betrayed to the French.

The two prisoners sought by every means in their power to hide the evidence of their daily intercourse. It was now the abbé's pleasure to pass much of the time instructing Edmond in those branches of knowledge in which he himself was skilled.

Edmond proved an apt pupil, and those long hours spent by the one in giving, and the other in receiving, knowledge of philosophy, history, science and languages brought to the lives of both a melancholy pleasure which dulled the keen edge of their sorrow.

The abbé, by studying Edmond's case, was able to show to him that the enemy who had caused his imprisonment in the Château d'If could be none other than Villefort, in whom he had been greatly deceived. His own history the abbé related at length to his younger companion, and eventually, when his strength gave evidence of failing and a stroke of paralysis disabled one of his arms, he let Edmond into his great secret. It was this secret that had won him the title of the "Mad Abbé."

Before he had been arrested, the abbé had been secretary to the Count of Spada, the last of a famous race of Italian noblemen, who had died on December 25, 1807. It had come to the knowledge of the abbé during his association with the count that one of the Spadas of the fifteenth century,

"THE SEA IS THE CEMETERY OF THE CHATEAU D'IF"

The most thrilling part of Monte Cristo is the story of Dantès' escape after fourteen years' imprisonment. Another prisoner had scraped a tunnel through the wall, only to find himself in the cell of Dantès. When the elder prisoner died, the jailers put his body in a sack to throw it in the sea. But, creeping into the cell of his dead friend, Dantès removed the body and sewed himself in the sack. Thus he was thrown into the sea, and ripping the sack up with his knife, he escaped.

who was a cardinal, had been poisoned, together with his nephew, by the agents of Cæsar Borgia, so that his immense fortune might come into the possession of the pope and his friends.

But an extremely careful study of the history of all the famous people in Rome connected in any way with the Spadas of that time had proved to the Abbé Faria that no one seemed to have benefited by the deaths of Cardinal Spada and his nephew. The abbé judged from this that the cardinal had hidden his fabulous riches somewhere to prevent their falling into the hands of his enemies at Rome, and had arranged to let his nephew into his secret, but no one else.

For years had Faria searched among the documents of the Spada family in the hope of finding something in the nature of a will, but discovered nothing. At the death of his patron, the count, he inherited the library of that nobleman, with its famous medieval breviary, or prayer-book, which had been one of the treasures of the Spadas. One night, requiring a light hastily, he groped about in the darkness for the breviary, recollecting an old piece of paper, brown with age, which had been used as a marker in it, probably for centuries. He considered this of no value, as it bore no writing, and put the end of it into the fire to light it. But, to his amazement, as it burst into flame he saw yellowish handwriting begin to appear upon it.

THE BURIED TREASURE IN THE ISLAND OF MONTE CRISTO

Immediately he extinguished the flame, though not before a considerable part of the paper had been destroyed. In great excitement he lighted his taper in the fire itself, and then, examining the paper, found that the action of the heat had brought out some writing traced originally in an ink which became visible only when held to the fire. This is what he read:

This 25th day of April, 1498, be . . .
Alexander VI and fearing that not . . .
he may desire to become my heir and re . . .
and Bentivoglio, who were poisoned . . .
my sole heir, that I have bu . . .
and has visited with me, that is in . . .
island of Monte Cristo all I poss . . .
jewels, diamonds, gems, that I alone . . .
may amount to nearly two mil . . .
will find on raising the twentieth ro . . .
creek to the east in a right line. Two open .
in these caves; the treasure is in the furthest a .
which treasure I bequeath and leave en . . .
as my sole heir.

25th April, 1498. CÆS

Being thrust into prison soon after this discovery, the Abbé Faria had given almost endless study to the task of completing the unfinished lines. After many years his efforts had been rewarded with success. He had satisfied himself that the portion of the paper which was burned away had read thus:

. . . ing invited to dine by his Holiness
. . . content with making me pay for my hat
. . . serves for me the fate of Cardinals Caprara
. . . I declare to my nephew Guido Spada
. . . ried in a place he knows
. . . the caves of the small
. . . essed of ingots, gold, money,
. . . know of the existence of this treasure which
. . . lions of Roman crowns, and which he
. . . ck from the small
. . . ings have been made
. . . ngle in the second;
. . . tire to him

. . . AR SPADA.

The abbé explained at great length, and with much excitement, how he had come to solve the mystery of the burned paper, and his solution proved that on the island of Monte Cristo treasure valued at something like thirteen million livres awaited the lucky person who knew where to find it.

THE DEATH OF THE ABBE FARIA AND WHAT IT LED DANTES TO ACHIEVE

Dantès knew the island, which lies between Corsica and Elba. Indeed, he had once touched at it. It is a rock of almost conical form, probably thrown up originally in some volcanic disturbance. Dantès traced a plan of it, and the abbé gave him advice as to how he thought the treasure might be recovered. For poor Faria had now abandoned all hope of ever being free himself to search for the treasure of Monte Cristo. Since his paralytic seizure he feared his end was near, and wished that Dantès might know his secret in case he succeeded in escaping from the prison. It was not long, indeed, before the poor abbé died. Edmond was plunged into a new agony of mind at the loss of his friend, who had been more than life to him, and at the hopelessness of the future. But the death of his friend proved the means of his own escape, a description of which we give in the words of the book:

THE ESCAPE FROM CHATEAU D'IF

ALONE! he was alone again! fallen back into silence! He found himself once again in the presence of nothingness! Alone,—no longer to see, no longer to hear the voice of the only human being who attached him to life! Was it not better, like Faria, to go and ask of God the meaning of life's enigma at the risk of passing through the mournful gate of suffering? The idea of suicide, driven away by his friend and forgotten in his presence while living, arose like a phantom before him in presence of his dead body. "If I could die," he said, "I should go where he goes, and should assuredly find him again. But how to die? It is very easy," he continued with a smile of bitterness; "I will remain here; I will rush on the first person who opens the door; I will strangle him, and then they will guillotine me."

But as it happens that in excessive griefs, as in great tempests, the abyss is found between the tops of the loftiest waves, Dantès recoiled from the idea of this infamous death and passed suddenly from despair to an ardent desire for life and liberty.

"Die! oh no!" he exclaimed; "not die now, after having lived so long, and suffered so much! It might have been good to die when I formed the purpose to do so, years ago; but now it would be indeed to give way to my bitter destiny. No, I will live; I will struggle to the very last; I will reconquer the happiness of which I have been deprived. Before I die I must not forget that I have my executioners to punish, and perhaps too, who knows, some friends to reward. But here I am, forgotten; and I shall go out from my dungeon only as Faria goes." As he said this he remained motionless, his eyes fixed like a man struck with a sudden idea, but whom this idea fills with amazement. Suddenly he rose, lifted his hand to his brow as if his brain were giddy, paced twice or thrice round his chamber, and then paused abruptly at the bed. "Ah! ah!" he muttered, "who inspires me with this thought? Is it thou, gracious God? Since none but the dead pass freely from this dungeon, let me assume the place of the dead!"

Without giving himself time to reconsider his decision, and indeed that he might allow his thoughts to be distracted from his desperate resolution, he bent over the appalling sack, opened it with the knife which Faria had made, drew the corpse from the sack, and carried it to his cell, laid it on his couch, passed round its head the strip of cloth he wore at night round his own, covered it with his counterpane, once again kissed the ice-cold brow and tried vainly to close the resisting eyes, which remained open, turned the head towards the wall, so that the jailer might, when he brought his evening meal, believe that he was asleep, as was his frequent custom, returned along the gallery, drew the bed against the wall, returned to the other cell, took from the hiding-place the needle and thread, flung off his rags, that they might feel naked flesh only beneath the coarse sackcloth, and getting inside the sack, placed himself in the posture in which the dead body had been laid, and sewed up the mouth of the sack on the inside.

The beating of his heart might have been heard if by any mischance the jailers had entered at that moment. He might have waited until the evening visit was over, but he was afraid the governor might change his resolution and order the dead body to be removed earlier; in that case his last hope would have been destroyed. Now his project was settled under any circumstances, and he hoped thus to carry it into effect. If on the way out the grave-diggers should discover that they were conveying a live instead of a dead body, Dantès did not intend to give them time to recognize him, but with a sudden cut of the knife he meant to open the sack from top to bottom and profiting by their alarm, escape; if they tried to catch him, he would use his knife. If they conducted him to the cemetery and laid him in the grave, he would allow himself to be covered with earth; and then, as it was night, the grave-diggers could scarcely have turned their backs ere he would work his way through the soft soil and escape. He hoped that the weight would not be too heavy for him to support. If he was deceived in this, and the earth proved too heavy, he would be stifled, and then so much the better; all would be over. Dantès had not eaten since the previous evening, but he had not thought of hunger or thirst, nor did he now think of it. His position

was too precarious to allow him time to think of anything else.

The first risk that Dantès ran was that the jailer, when he brought his supper at seven o'clock, might perceive the substitution he had effected; fortunately, twenty times at least, from misanthropy or fatigue, Dantès had received his jailer in bed; and then the man placed his bread and soup on the table, and went away without saying a word. This time the jailer might not be silent as usual, but speak to Dantès, and seeing that he received no reply, go to the bed and thus discover all.

When seven o'clock came, Dantès's agony really commenced. His hand placed upon his heart was unable to repress its throbbings, while with the other he wiped the perspiration from his temples. From time to time shudderings ran through his whole frame and oppressed his heart as if it were seized in an icy grasp. Then he thought he was going to die. Yet the hours passed on without any stir in the château, and Dantès perceived that he had escaped this first danger; it was a good augury. At length, about the hour the governor had appointed, footsteps were heard on the stairs. Edmond understood that the moment had arrived, and summoning up all his courage, held his breath; he would have been glad to repress at the same time the rapid pulsations of his arteries.

The steps paused at the door; there were steps of two persons, and Dantès guessed it was the two grave-diggers who came to seek him. This idea was soon converted into certainty when he heard the noise they made in putting down the hand-bier. The door opened, and a dim light reached Dantès's eyes through the coarse sack that covered him; he saw two shadows approach his bed, a third remaining at the door with a torch in his hand. Each of these two men, approaching the ends of the bed, took the sack by its extremities.

"He's heavy, though, for an old and thin man," said one.

"They say every year adds half a pound to the weight of the bones," said another, lifting the feet.

"Have you tied the knot?" inquired the first speaker.

"What would be the use of carrying so much more weight?" was the reply; "I can do that when we get there."

"Yes, you're right," replied the companion.

"What's the knot for?" thought Dantès.

They deposited the supposed corpse on the bier. Edmond stiffened himself in order to play his part of a dead man, and then the party, lighted by the man with the torch, who went first, ascended the stairs. Suddenly Dantès felt the fresh and sharp night air, and he recognized the *mistral*. It was a sudden sensation, at the same time replete with delight and agony. The bearers advanced twenty paces, then stopped, putting their bier down on the ground. One of them went away, and Dantès heard his shoes on the pavement.

"Where am I, then?" he asked himself.

"Really, he is by no means a light load!" said the other bearer, sitting on the edge of the hand-barrow. Dantès's first impulse was to escape, but fortunately he did not attempt it.

"Light me, stupid," said the other bearer, "or I shall not find what I am looking for." The man with the torch complied, although not asked in the most polite terms.

"What can he be looking for?" thought Edmond. "The spade, perhaps."

An exclamation of satisfaction indicated that the grave-digger had found the object of his search. "Here it is at last," he said, "not without some trouble, though."

"Yes," was the answer; "but it has lost nothing by waiting."

As he said this, the man came towards Edmond, who heard a heavy and sounding substance laid down beside him, and at the same moment a cord was fastened round his feet with sudden and painful violence.

"Well, have you tied the knot?" inquired the grave-digger who was looking on.

"Yes, and pretty tight too, I can tell you," was the answer.

"Move on, then." And the bier was lifted once more, and they proceeded. They advanced fifty paces farther, and then stopped to open a door, then went forward again. The noise of the waves dashing against the rocks on which the château is built, reached Dantès's ear distinctly as they proceeded.

"Bad weather!" observed one of the bearers; "not a pleasant night for a dip in the sea."

"Why, yes, the abbé runs a chance of being wet," said the other; and then there was a burst of laughter. Dantès did not comprehend the jest, but his hair stood erect on his head.

"Well, here we are at last," said one of them.

"A little farther! a little farther!" said the other. "You know very well that the last was stopped on his way, dashed on the rocks, and the governor told us next day that we were careless fellows."

They ascended five or six more steps, and then Dantès felt that they took him, one by the head and the other by the heels, and swung him to and fro. "One!" said the grave-digger, "two! three, and away!" And at the same instant Dantès felt himself flung into the vast void, passing through the air like a wounded bird,—falling, falling with a rapidity that made his blood curdle. Although drawn downwards by some heavy weight which hastened his rapid descent, it seemed to him that the fall continued through a hundred years. At last, with a terrific dash he entered the ice-cold water; and as he did so he uttered a shrill cry, stifled in a moment by his immersion beneath the waves.

Dantès had been flung into the sea, into whose depths he was dragged by a thirty-six pound shot tied to his feet. The sea is the cemetery of Château d'If.

. . . . . .

Dantès, although giddy and almost suffocated, had yet sufficient presence of mind to hold his breath; and as his right hand (prepared as he was for every chance) held his knife open, he rapidly ripped up the sack and extricated his arm and then his body; but in spite of all his efforts to free himself from the ball, he continued to sink. He then bent his body and by a desperate effort severed the cord that bound his legs, at the moment he was suffocating. With a vigorous spring he rose to the surface of the sea, while the bullet bore to its depths the sack that had so nearly become his shroud.

Dantès merely paused to breathe, and then dived again, in order to avoid being seen. When he rose a second time, he was fifty paces from where he had first sunk. He saw overhead a black and tempestuous sky, over which the wind was driving the fleeting vapours that occasionally suffered a twinkling star to appear; before him was the vast expanse of waters, sombre and terrible, whose waves foamed and roared as if before the approach of a storm. Behind him, blacker than the sea, blacker than the sky, rose like a phantom the giant of granite, whose projecting crags seemed like arms extended to seize their prey; and on the highest rock was a torch that lighted two figures. He fancied these two forms were looking at the sea; doubtless these strange grave-diggers had heard his cry. Dantès dived again, and remained a long time beneath the water. This manœuvre was already familiar to him, and usually attracted a crowd of spectators in the bay before the lighthouse at Marseilles when he swam there, who with one accord pronounced him the best swimmer in the port. When he reappeared the light had disappeared.

. . . . . .

We leave the exact words of the book to continue the story of Dantès in briefer form.

He then struck boldly out to sea, which was rising in a tempest of wind, and, fortunately, was picked up by a sailing vessel, to whose captain he explained that he was the only one saved from the crew of a Maltese boat.

He learned that it was the 28th of February of the year 1829, so that it was fourteen years, day for day, since his arrest. He wondered what had become of Mercédès, who must believe him dead. Then his eyes lighted up with hatred as he thought of the three men who had caused him so long and wretched a captivity. Now at liberty, and safe on board the sailing vessel bound for Leghorn, he renewed an oath of implacable vengeance against Danglars, Fernand and Villefort.

It was not long before he had discovered the secret cave in the island of Monte Cristo, with all its dazzling wealth, as the Abbé Faria had truly foretold. He now stood possessed of such means of vengeance as never in his wildest dreams had any innocent prisoner hoped to be able to command.

Some two years later the keeper of the Pont du Gard inn, not far from the town of Beaucaire, was, as usual, lounging listlessly at his door, for trade was bad and he had but little custom, when a traveler on horseback dismounted at his door and entered. The stranger proved to be a clergyman of grave and reverend aspect,

and the innkeeper made rather a fuss in attending upon him. The visitor, who gave the name of the Abbé Busoni, and whose dark and penetrating eyes seemed to search into the inmost mind of the innkeeper, speedily banished the listlessness of that person, and made him all excitement by recalling the events which had occurred sixteen years before.

The name of the innkeeper was Gaspar Caderousse, which fact the abbé knew, and he astonished Caderousse by showing a minute knowledge of his earlier history. Of Edmond Dantès the innkeeper spoke with much warmth of feeling, and swore that he had ever deeply and sincerely lamented the unhappy fate of that poor young man. The abbé explained that he had been present at the death of Dantès in prison, and said that even in his dying moments the prisoner had protested he was utterly ignorant of the cause of his imprisonment.

"And so he was!" exclaimed Caderousse. "How should he have been otherwise? Ah, Monsieur l'Abbé, the poor fellow told you the truth." All that the intelligence of the poor Abbé Faria had been able to guess at from Edmond's own story was confirmed and made plain by the statements of Caderousse, who proved to his visitor that Danglars and Fernand had been the deadly enemies of Edmond.

How all the enemies of Edmond Dantes had prospered

But whereas Danglars had prospered and was now rolling in wealth, and Fernand also had risen to great things, being now the Count de Morcerf, Monsieur Morrel, who had been a real friend to Edmond and ever an honest man, was in dire extremities, as his great shipping business had met with a series of misfortunes.

The wicked had flourished and the honest had suffered. Danglars' fortune had been built up by fraud. Fernand, now a distinguished soldier, had made his success when, as a French soldier in the service of the Greeks, he betrayed the Albanian patriot Ali Pasha to the Turks, thus getting a traitor's reward from the enemy, as well as stealing the fortune of his victim. The Countess de Morcerf was the Mercédès who was to have married Edmond, and who had, indeed, truly mourned her lost lover until all hope was lost. Monsieur de Villefort had married Mademoiselle de Saint-Méran, and soon after left Marseilles.

The strange Count of Monte Cristo comes to Paris

It was about eight years after this that a certain Count of Monte Cristo became a great figure in the life of Paris. His name awakened thoughts of romance and dazzling wealth in the minds of all, for he was the hero of a hundred strange stories, more suggestive of the time of the Arabian Nights than of the first half of the nineteenth century. It was Albert, the son of the Count de Morcerf, who first introduced the Count of Monte Cristo to the high society of Paris. They had become acquainted at Rome, where Monte Cristo had been able to render a great service to the Viscount Albert de Morcerf and his friend the Baron Franz d'Epinay.

All sorts of stories were afloat in Paris as to the history of this Count of Monte Cristo. When he went to the opera he was accompanied by a beautiful Greek girl, said to be a princess, named Haidée, whose guardian he was. A well-known lady declared he was a vampire! But the air of mystery about him was just what Paris liked, and the fact that he had unlimited credit at the bank controlled by the Baron Danglars was enough to make him talked about and to open all doors to him.

Through Bertuccio, his steward, Monte Cristo learned that, years before, Villefort had tried to bury a little infant that was still alive. That child Bertuccio had reared and had given him the name Benedetto. He had now grown to be a scoundrel of the worst type and was a criminal outcast.

Villefort had a daughter by his first wife, for he had married a second time. Her name was Valentine, and at the command of her father, but not by her own wish, she was engaged to be married to the Baron Franz d'Epinay. This beautiful girl was in love with a gallant young military officer named Maximilian Morrel, son of the Marseilles shipowner. But neither of them had dared to avow their affection for each other to Valentine's father.

The man who signed himself "Sindbad the Sailor"

It was Franz, however, who told Maximilian that among the stories of Monte Cristo it was said he often gave great gifts of money to help deserving people, and

signed himself "Sindbad the Sailor." This was great news for Maximilian, for his father had been saved from ruin by a generous gift from an unknown benefactor who had signed himself "Sindbad the Sailor." He hastened to the house of Monte Cristo to thank him for his generosity, and from that day became a devoted admirer of the strange man. His inmost thoughts he told to him, and all the story of his hopeless love for Valentine.

Meanwhile the tide of fortune seemed to have turned with Baron Danglars. His business had suffered many losses, but his greatest loss of all was due to some false news about the price of stocks and shares which had been sent to Paris by means which Monte Cristo could have explained. The baron's daughter was engaged to Albert de Morcerf, but the Count de Morcerf had now come under a cloud, for his betrayal of Ali Pasha had been made public; and perhaps the Count of Monte Cristo could have told how the truth had come out at last. So the baron did not hesitate to break the engagement and to accept as the suitor for his daughter a dashing young man known as Count Cavalcanti, who had been introduced to Paris by Monte Cristo, but concerning whose antecedents nothing at all seemed to be known.

THE DOWNFALL OF THE FIRST OF DANTES' ENEMIES

The Count de Morcerf was tried for his betrayal of Ali, and seemed likely to be acquitted, when a veiled woman was brought to the place of trial and testified before the committee that she was the daughter of Ali Pasha, and that Morcerf had not only betrayed her father to the Turks but had sold her and her mother into slavery. The veiled woman was Haidée, the ward of Monte Cristo. The Count de Morcerf was now a ruined man. Monte Cristo revealed himself to the former Fernand, now Morcerf.

Gazing for a moment in terror at this man who seemed to have risen from the dead to avenge his wrongs, Morcerf turned, seeking the wall to support him, glided along close to it until he reached the door, by which he went out backward, uttering the one distressing cry—"Edmond Dantès!"

Events marched rapidly now, and Paris had scarcely ceased talking of the suicide of the Count de Morcerf when Cavalcanti was arrested for the murder of a fellow-convict named Caderousse, who had been blackmailing him. Caderousse had identified Cavalcanti as a former galley-slave named Benedetto.

THE FALL OF BARON DANGLARS AND HIS FLIGHT FROM FRANCE

It now came out that both Benedetto and Caderousse had been liberated by a mysterious Englishman who had spent large sums of money to enable them to escape. The Englishman's name was Lord Wilmore, but he and the Abbé Busoni and the Count of Monte Cristo were the same person, though the police knew it not.

Danglars fled from France, his great business in ruin, and with him he took a large sum of money belonging to the Paris hospitals.

In the household of Villefort, Monte Cristo had done nothing to bring vengeance on that evil man. He had seen from the first that Villefort's second wife took great interest in chemistry because she was studying the art of poisoning, and he felt that revenge was already at work here. There had already been two mysterious deaths in the Villefort family, and now the beautiful Valentine, according to the doctor, seemed to be suffering from the early effects of some slow poison.

Maximilian Morrel, in despair of Valentine's life, rushed to Monte Cristo for his advice and assistance.

"Must I let one of the accursed race escape?" Monte Cristo asked himself, but decided, for Maximilian's sake, that he would save Valentine.

VENGEANCE AT WORK IN THE HOME OF VILLEFORT

Monte Cristo had bought the house adjoining that of Villefort, and, cleaning out the tenants, had engaged workmen to make repairs and alterations. He had made them remove so much of the old wall between the two houses that it was a simple matter for him to take out the remaining stones and pass into a large cupboard in Valentine's room. Here the Count watched while Valentine was asleep, and saw Madame de Villefort creep into the room and substitute for the medicine in Valentine's glass a dose of poison.

He then entered the room as Valentine awoke, but before she could cry out in amazement he made her keep silence, and told what he had seen. He threw half

the draft into the fireplace, leaving the rest in the glass, and gave Valentine one of his famous pellets of hashish, which made her sink into a death-like sleep. He then retired to watch again, and in a little time Madame de Villefort returned.

Thinking that Valentine had drunk half of the poison, she threw the rest away, but Monte Cristo knew the poison, and, having brought some of the same with him, went in again and half filled the glass.

Next morning the doctor declared that Valentine was dead. In the glass he discovered poison, and as the same poison was found in Madame's laboratory, there was no doubt of her guilt. She admitted all, and confessed that her object had been to make her own son the sole heir to Villefort's fortune.

THE TRAGIC FATE OF THE MAN WHO SENT DANTES TO THE CHATEAU D'IF

Madame de Villefort fell at her husband's feet. He addressed her with passionate words of reproach as he turned to leave her presence. "Think of it, Madame," he said, "if on my return justice has not been satisfied, I will denounce you with my own mouth, and arrest you with my own hands! I am going to the court to pronounce sentence of death on a murderer. If I find you alive on my return, you shall sleep to-night in jail."

Madame sighed, her nerves gave way, and she sank on the carpet.

"Farewell, Madame, farewell!" said her husband as he left the room.

Villefort then went to court to pass sentence on a criminal, the so-called Cavalcanti, who proved to be Benedetto. Benedetto announced that he was really Villefort's son. Proof was produced which Villefort could not deny. He went to his home to find his son Edward poisoned and his wife dying.

This was more than the brain of man could endure, and Villefort turned from the tragic scene a raving madman, rushed wildly to the garden and began to dig with a spade.

It was not long after this that the Baron Danglars was cleverly entrapped by some brigands in the catacombs of St. Sebastian, some little way outside Rome, and there, instead of being held to ransom, he was made to pay such fabulous sums for food and lodging that the money he had stolen from the charities on running away from Paris was very quickly transferred to the pockets of the brigands. But at length Monte Cristo appeared to the prisoner, and after accusing him of his crimes, told him that he was in the hands of Edmond Dantès. At this Danglars uttered a cry and fell prostrate.

THE WAY THAT MONTE CRISTO PUNISHED BARON DANGLARS

"Rise," said the count. "Your life is safe; the same good fortune has not happened to your accomplices; one is mad, the other dead. Keep the 50,000 francs you have left: I give them to you. The 5,000,000 you stole from the hospitals has been restored by an unknown hand. And now eat and drink, and when you are satisfied you shall be free."

Danglars stayed that night with the brigands, but in the morning he found himself lying near a stream. Being thirsty he dragged himself toward it, and as he stooped to drink he perceived that his hair had become quite white.

The vengeance of Edmond Dantès, so long delayed, so carefully and laboriously planned, was now complete, and it only remained for him to perform the last of his marvels, at the same time giving proof of his boundless generosity. Valentine de Villefort had been buried, and Maximilian resolved to die; but Monte Cristo urged the young man to have patience and hope, and as his father had been a father to Edmond Dantès, so would Dantès be a father to him.

MONTE CRISTO MAKES A STRANGE BARGAIN WITH MAXIMILIAN MORREL

It seemed a strange thing to ask a lover whose sweetheart had been placed within the tomb to have hope and to come to Monte Cristo in one year. But this was the bargain they made.

Mercédès and her son had meanwhile given to charities the ill-gotten fortune left by Fernand. Monte Cristo had bought the house his father lived in at Marseilles, and in the garden there he had buried the dowry he had originally saved up when he was to be married to Mercédès. This house and the buried dowry he now gave to her, and there the beautiful countess spent her days in the simplest way, her son helping her also from his pay as an army officer.

When the year had passed during which Monte Cristo had bidden Maximilian Morrel to hope, the two met at Marseilles and then went by yacht to the island of Monte Cristo. Seated in the mysterious

cave, the count asked him whether he was still of the same mind, and he replied that nothing had touched his grief as the loss of Valentine. He was still resolved to die. It was yet three hours from the time until which Maximilian had promised to remain alive. The two friends talked much about the joys and sorrows of life as they sat there in that strange room, where the statues that stood around the banqueting-table had silver baskets always full of fruit, no matter how much was taken away. At last the count gave Maximilian a spoonful of a mysterious substance which was supposed to effect a painless death.

How two lovers were strangely united, thanks to Monte Cristo

Just as the young man seemed to be sinking softly into unconsciousness he saw Monte Cristo open a door leading to another room, and on the threshold, illumined by a strong light, stood a beautiful young woman the picture of the beloved Valentine. This was no dream, and Morrel was not dying. It was indeed Valentine, who, when she was supposed to have died, was only in a trance, induced by the pellet given to her by the count. Monte Cristo had rescued her from the tomb, revived her, and for these twelve months, while the love of Morrel had stood its test, Valentine had been the companion of Haidée. As the truth of his new-found happiness dawned upon the faithful young man, Monte Cristo had some real reward for the service he had rendered the lovers; and when he learned that he was himself as much beloved by Haidée as Maximilian was by Valentine, it seemed to this strange and wonderful man that life might still have a greater happiness for him than the fulfillment of his vengeance.

The next morning when Valentine and Maximilian met and went out to the beach, Jacopo, the captain of Monte Cristo's yacht, had a letter for them, which Morrel opened and read.

"My dear Maximilian,

"There is a felucca for you at anchor. Jacopo will conduct you to Leghorn, where M. Noirtier awaits his granddaughter, whom he wishes to bless before you lead her to the altar. All that is in this grotto, my friend, my house in the Champs Elysées, and my château at Tréport are the marriage gifts bestowed by Edmond Dantès upon the son of his old master, Morrel. Mademoiselle de Villefort will share them with you; for I entreat her to give to the poor the immense fortune reverting to her from her father, now a madman, and her brother, who died last September with his mother. Tell the angel who will watch over your future destiny, Morrel, to pray sometimes for a man who, like Satan, thought himself, for an instant, equal to God, but who now acknowledges, with Christian humility, that God alone possesses supreme power and infinite wisdom. Perhaps those prayers may soften the remorse he feels in his heart. As for you, Morrel, this is the secret of my conduct toward you. There is neither happiness nor misery in the world; there is only the comparison of one state with another, nothing more. He who has felt the deepest grief is best able to experience supreme happiness. We must have felt what it is to die, Morrel, that we may appreciate the enjoyments of life.

"Live, then, and be happy, beloved children of my heart! And never forget that, until the day when God will deign to reveal the future to man, human wisdom is contained in these two words—*wait* and *hope*.

"Your friend,

"Edmond Dantès,

"Count de Monte Cristo."

The last words of Monte Cristo and the last we hear of him

During the reading of this letter, which informed Valentine for the first time of the madness of her father and the death of her brother, she became pale. A heavy sigh escaped from her bosom, and tears, not the less painful because they were silent, ran down her cheeks. Her lover, too, was overcome by the generosity of the bitterly wronged count who had been Edmond Dantès.

"But where is the count?" asked Morrel eagerly. Jacopo pointed toward the horizon where a white sail was visible.

"And where is Haidée?" asked Valentine. Jacopo still pointed toward the sail.

"Gone!" said Morrel. "Adieu, my friend. Who can say whether we shall ever meet them again?" His eyes were filled with tears.

"My friend," said Valentine, "has not the count just told us that all human wisdom is contained in these two words—*wait* and *hope?*"

THE NEXT STORY OF FAMOUS BOOKS IS ON PAGE 6757.

In this picture we see the great wall of mountains that incloses the land of Tibet and has acted as a barrier against invasion for centuries. It is the difficulty of getting into the country, across its mountains and deserts, that makes Tibet still the least-known country in the world.

THE HEART OF ASIA

TIBET, TURKESTAN, MONGOLIA AND AFGHANISTAN

CONTINUED FROM 6463

IN the stories of the countries of Europe we often read of the wild fierce settlers and conquerors from the centre of Asia who laid waste the countries through which they passed. We know these tribesmen from Asia by the names of Tartars and Huns. Hundreds of years ago the population of Europe was very small, and it seemed to persons living then that the Tartars and Huns spread over the land in numbers too great to be counted. As time went on these warlike wandering tribes lost their power. Some of them settled in Europe and became less fond of fighting. But many went back to the great uncrowded tract of land whence they or their fathers came. It is this land, as large as the whole of Europe, which is called the "Heart of Asia." If you look at a map of Asia you will see in the centre of the map four countries—Turkestan, Tibet, Mongolia and Afghanistan. These countries make up the heart of Asia. Few foreigners have visited this part of the world, and it has come to be thought a land of mystery.

In Europe more than 400 millions of people live and work. But there is a population of only about 21 millions in that part of Asia lying between Siberia and India on the north and south, and Persia and China on the east and west. By far the greater number of these 21 millions make their homes in tents, and wander about in search of fresh pasture for the immense flocks and herds that they rear on the steppes, as the rolling plains are called. Others farm the fertile valleys and oases that are made to produce crops by the life-giving waters of the rivers. The chief point in Central Asia is the "Roof of the World"—the Pamir Plateau—north of the great bend which the river Indus makes when it breaks through the Himalaya Mountains. The treeless and rocky valleys of this tableland are covered with snow for many months of the year. They equal in height the highest mountains in Switzerland, being about three miles above the level of the sea. The mountains that cross this plateau and circle around it rise a mile or more higher still. To understand the connection of this "Roof of the World" with the mountain ranges that meet upon it, we must study a relief map of Asia.

From the southwest corner of the plateau spring the mighty heights of the Himalayas, covered with snow, extending for fifteen hundred miles eastward above the plains of India. The majestic range of Kwen Lun, with the loftiest passes in the world, runs eastward from the southeast corner of the Pamirs. From the north of the plateau the great Thian Shan range—the "Mountains of Heaven"—runs eastward for a distance as far as from Pensacola, Florida, to Montreal, Canada, toward the Mongolian plateau, which in turn is crossed by the Altai Mountains, south of Siberia. From the southwest of the Pamir plateau the ranges of the Hindu Kush cross Afghanistan. These run on to form the northern boundary of the Persian desert, and join the Elburz Mountains south of the Caspian Sea. Many shorter ranges, such as the Karakorum, or Mustagh—whose greatest heights are not far below the height of the main Himalayas—and the Suliman, gather like buttresses round the "Roof of the World."

THE WHITE MOUNTAIN PEAKS THAT LOOK DOWN UPON CENTRAL ASIA

If we could but look down from above on these giant mountain walls—the framework of Central Asia—what a scene of extraordinary beauty and loneliness would meet our eyes! Nearest us would be the dazzling white of the snowy peaks, for most of the mountains of Central Asia are far above the line of perpetual snow, surrounded by immense glaciers and icefields. In contrast with all this would be the dark bare pinnacles of rock, the fearsome precipices and cliffs, girdled lower down by dark forests and rushing streams. From these stretch downward grassy slopes covered with lighter vegetation and masses of crimson rhododendrons and other alpine flowers.

Between these mountain walls, which act as barriers to the moisture in the air, to plants and animals, and to races of men, lie the countries that make up Central Asia.

THE LITTLE-KNOWN LAND WHICH STANDS THREE MILES ABOVE SEA-LEVEL

Let us now find these countries upon the map. On the east of the Pamirs is the high tableland of Tibet, between the Himalayas and the Kwen Lun Mountains. Tibet is larger than the province of Ontario and more than four times as large as Arizona. Most of its surface, like the Pamir Plateau, is three miles above the level of the sea, with many peaks rising higher still. Eastern Turkestan, more than four times as large as Colorado, or as large as Manitoba and Saskatchewan combined, is bounded by the Hindu Kush, the Pamirs and the Thian Shan Mountains, and the great Desert of Gobi. Much of the country is desert, and it is only along the Tarim River, and the few rivers that run into it, that there is any cultivation of pasture. On the map you may find the name Sin Kiang instead of Eastern Turkestan.

The vast upland of Mongolia, of about the same area as Arabia, lies beyond the Thian Shan Mountains, and is bounded by Siberia and Manchuria. All these three countries of Central Asia have long been practically part of the vast Empire, now the Republic, of China.

Mongolia has made several attempts to throw off the yoke of China since the Chinese Revolution in 1911. But its efforts have not been successful. Tibet is under Chinese rule in name only, for in 1911 the Tibetans expelled the Chinese garrison. China has tried to send forces into the country again but has failed in each attempt. Two great rivers, the Syr Daria and the Amu Daria—*Daria* is the Persian word for "river"—flow from the heights of the Thian Shan and the Pamirs over the plain of Western Turkestan to the inland sea of Aral. Russian Central Asia stretches over these valleys from the Pamirs to Siberia, from the Caspian to the borders of Eastern Turkestan, nearly one-half the area of Canada.

WANDERING TRIBES & FERTILE VALLEYS IN THE GREAT DESERTS OF ASIA

We read in the story of Russia that begins on page 5847 how much of this vast country is desert and how much consists of grassy steppes on which wandering tribes, such as the Kirghiz and Turkomans, raise immense flocks and herds. We may at the same time glance at the fertile oases and river valleys, with their fine crops of fruit, vegetables, grain and cotton for the mills of Moscow and Warsaw. In parts of Western Turkestan coal is found to be abundant. It will be of great use as fuel for the railways and river and lake steamers of the district if ever the supply of petroleum refuse from Baku, which is now used, should fail.

Before the World War Russian enterprise had brought the railway from the

MOUNTAIN AND PLAIN IN CENTRAL ASIA

The land of Tibet is about one-sixth the size of Australia and is inclosed by the loftiest mountains in the world. It is higher up than any other country of its size. It consists of great plateaus, and the average height of the country is said to be as great as Mont Blanc. This gorge is typical of Tibet.

Away from the mountains, the heart of Asia consists of vast deserts cut up by rivers and dotted with lakes that seem to be disappearing as the deserts extend. This shows the boats used by the people.

Reproduced, by permission, from Dr. Sven Hedin's Scientific Results of a Journey in Central Asia.

Caspian to the foot of the Thian Shan Mountains, linking together the towns situated on the oases and in the fertile valleys. One likes to think what the impetuous Tamerlane, who made his headquarters at Samarkand, would have thought of this rapid means of traveling.

Thus, far into the heart of Asia, the "iron horse," with its shriek and snort, breaks the silence and opens up possibilities of trade and travel on very different lines from those of old, which we can still study in Chinese Central Asia.

Let us start our travels in Mongolia, the vast grassy uplands lying between China and Siberia, and circled by snow-topped mountains whose lower slopes are covered by forests. The great Desert of Gobi, treeless and waterless, about two thousand miles long, is at its centre. It is in this desert that three American Asiatic expeditions under Roy Chapman Andrews have made important discoveries about the huge animals that lived before history began. In the northwest the Altai Mountains give rise to many

CENTRAL ASIA—AFGHANISTAN, TIBET, TURKESTAN AND PART OF MONGOLIA

Since the World War automobile services take passengers and freight along the old caravan routes. For example, between Kalgan and Urga in Mongolia the journey is made in two days by automobile. By camel the journey takes a month. But the caravans of camels and ponies and asses, laden with goods, passing from one boundary to another, still toil over ancient routes from oasis to oasis, across deserts, by difficult mountain passes. The courageous explorers, to whom we owe most of our knowledge of this part of the world, make up their own caravans, taking their own provisions, boats, tents, maps—in fact, everything they need—along with them.

rivers that make fertile valleys. The greater number of the people of Mongolia are shepherds, tending their great flocks and herds as their ancestors have done from time immemorial. They live much the same life as their forefathers lived through the centuries. But the Mongols have ever been irresistible warriors, too, as well as shepherds, when occasion and great leaders arose.

It was a branch of these people, called the Huns, who swept across from the south of Lake Baikal, round which the Siberian railway now circles, along the "Land of Grass," which stretches from the banks of the Amur to those of the Volga. To understand this we must look

FAMOUS CITIES IN THE HEART OF ASIA

Not many years ago no such photograph as this existed; for Lhasa, which is shown in the picture, was the mysterious city of Tibet that no European was allowed to approach. Its name means "Home of the Gods," and it is here the Dalai Lama lives. A British expedition entered Lhasa in 1904.

Samarkand, which is in Russian Central Asia, existed before the time of Alexander the Great, who captured it during his conquering journeys. In 1369 it became the capital of another great world-conqueror, Tamerlane, or Timur. The green stone used by him as a throne is still in the city.

Kabul, the capital of Afghanistan, stands 6,000 feet above the level of the sea. It has a considerable trade in carpets, shawls and silk goods, and the district round is noted for its fruit. It was from Kabul that Lord Roberts set out in 1880 on his march to Kandahar, where he defeated the Afghans.

carefully at our map of Asia. We know how the Huns terrorized the dwellers in Europe, till their great leader, Attila, was turned back at Châlons, not far from the Atlantic, in the middle of the fifth century.

Another branch of the Mongols, the Turks, who were settled near the rich metal-bearing Altai range, became for a time very powerful in Central Asia. They, too, moved westward along the "Land of Grass," a few centuries after Attila. We know how strongly they influenced the history of Western Asia and of Europe. We also know how soon the Turks adopted Mohammedanism when they came in contact with it. This religion, simple and direct when it was first taught, has ever appealed strongly to the wandering tribes of Central Asia. Most of them to this day observe its customs, and devoutly say their prayers facing toward Mecca.

All through the early centuries advances were constantly made on Central Asia by the neighboring and ancient Empire of China. This came about partly owing to the rise of trade, and partly through wars, in which sometimes the Mongols had the best of it and sometimes the Chinese.

When Jenghiz Khan, the "Perfect Warrior," arose early in the thirteenth century to lead the Mongols, he conquered not only the rest of Central Asia, but Persia and China too. It was not till a century later that Mongol emperors were firmly on the throne in China, where they ruled for a period of two hundred years. After this the Mongols were driven out of China, and Mongolia became a Chinese province.

THE CONQUERING HORDES OF TARTAR WARRIORS THAT SWEPT ACROSS ASIA

In the story of Russia we read of the arrival of the Mongolian Tartars, on the north of the Black Sea, and of how strongly their influence stamped itself on the country for three hundred years. This influence is felt to this day. We know, too, how Timur, or Tamerlane, burst with his destroying armies over Persia and India, and then far away to Asia Minor, where he arrested for a time the power of the Ottoman Turks. The story of the great Mogul power in India, in the days of the Tudors and Stuarts, is told on page 2824.

At the same time that these fierce Mongols were warring on all the world within their reach, the old life on the steppes and the deserts was still going on. The patient camels were plodding along the old trade routes, carrying the silk from China, the precious jade stone from South Turkestan, the beautiful carpets and soft hangings, and all the other treasures and riches of the East which made it seem a perfect wonderland to Western minds.

The Western peoples, as we shall see later, for many hundreds of years had no chance of traveling and exploring in the wide regions of Central Asia. As these regions fell more completely under the power of the Chinese Empire less and less were foreigners admitted within their boundaries.

A MIGHTY RIVER THAT HAS NO MOUTH AND NEVER REACHES THE SEA

The two important towns of Kashgar and Yarkand, on the trade routes from China to India and Russia, lie at the western end of Eastern, or Chinese, Turkestan. Here the streams come down from the heights of the Pamirs and make some farming possible in this desert country.

The great Swedish explorer Sven Hedin spent much time in Chinese Turkestan, and to him we owe nearly all that is certainly known of the great river Tarim and its tributaries. Making his way over the mountains of the Pamirs from the railway terminus of the Trans-Caspian line, he arrived at Kashgar. He soon pushed on to a town on the upper part of the river, and after collecting native boatmen and stores and adapting a sort of house-boat he started on his wonderful journey on the Tarim, a river as long as the Yellowstone River in the United States or the Churchill River in Canada. Unlike the Danube and other rivers, the Tarim has no mouth and never reaches the sea. It dwindles away, after a long and winding course across a vast expanse of thirsty sand, in a system of shallow lakes.

A FAMOUS EXPLORER'S LONG JOURNEY ON AN ALMOST UNKNOWN RIVER

Sven Hedin spent three months in his house-boat, drifting, paddling and sailing, making observations and mapping out the winding course as he noted the surrounding country. On the banks of the river and its tributaries was every variety of scenery. Women and children waded out to bring melons and other food for his use from villages surrounded by culti-

THE PEOPLE WHO LIVE IN CENTRAL ASIA

The present inhabitants of Mongolia are wanderers, like their ancestors. Here we see a wealthy Mongol gentleman.

These are Sarts of Russian Central Asia. The word Sarts is used for the people who live in the towns. The language they speak is Turkish.

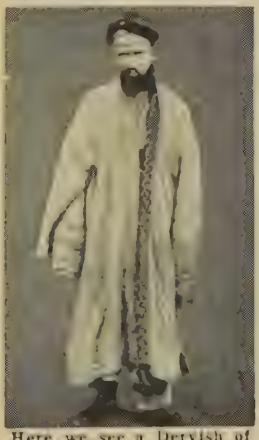
A rich Turkoman of Bokhara, where wealth consists chiefly of sheep, goats and camels. The Turkomans were once brigands.

The Afghans are a fierce warrior race who dislike living within the towns.

The Beloochis are a tall, daring race, although lazy and much given to brigandage. They always go about well armed.

This is a native soldier of Tibet armed with a curious flint-lock gun.

These girls are Kalmucks of Russian Central Asia, a Mongolian race of nomads found also in considerable numbers in the Chinese Empire.



Here we see a Dervish of Samarkand, the once famous capital of Tamerlane, who is buried there.

Women belonging to the Tartar tribes living in Russian Central Asia. This race came from Chinese Tartary, and were great conquerors.

vated fields. Groves of trees delighted his eyes—some like enchanted forests with the gorgeous red and gold of the autumn leaves, the stillness being sometimes broken by the flight of the wild ducks and geese on their way to winter quarters. Then came long stretches of pasture land, where lonely shepherds watched their flocks and fled terrified at the sight of the strange-looking tent-boat. It was the explorer's turn to be terrified when the green eyes of the tigers that came down to the river to drink, lapping like our tame cats, gleamed out of the darkness, and the tall reeds rustled and whistled in the breeze.

A RIVER THAT RUNS IN A DESERT BETWEEN HIGH CLIFFS OF SAND

All this time the sand that lay for an immeasurable distance on both sides, beyond the streak of cultivation brought by the river, was out of sight. Presently, however, it appeared again and formed high banks like cliffs, between which the boat glided on her journey in dreary stillness.

The ice stopped the boat at last, for when the river froze, the explorer had to start on the equally exciting and more dangerous part of his journey by land. Then came the loading of camels with food, firewood and other necessaries, and choosing of horses and asses and dogs, with the help of the natives who acted as guides and companions. Day after day the party wound their way for nearly two hundred miles across the desert. Sandstorms, difficult climbing over the loose sand-hills, piercing cold that froze the ink in the explorer's pen, scarcity of provisions—all fell to their lot.

But many interesting facts were discovered or proved true. Among these the shifting of lake and river beds and the former existence of forests where nothing now grows, were discovered by Hedin. Most wonderful of all, the explorer discovered that cities whose remains now lie buried under the ever drifting and shifting masses of sand once flourished in this dry, silent waste.

THE JOURNEY OF A LITTLE ENGLISH BOAT OVER THE DESERT LAKES

We long to linger with Sven Hedin in his adventures among the wonderful lakes in the Lop Nor district where the Tarim is finally lost. He reached this district when the spring had brought scorching heat and mosquitoes—very hard to bear in the desert loneliness. With a little canvas boat from England he paddled over the wide lakes, some gleaming with fish and wild swans, some intensely salt and still, and bearing no sign of life whatever. But we must leave the explorer and hurry on to cross the high passes of the north mountain wall of Tibet, some two thousand feet higher than the tops of the highest mountains of Switzerland. Here we meet intense cold, as well as tremendously high winds, blinding snowstorms and terribly rough paths. But the grand precipices and giant peaks are a fitting match for the southern boundary wall of Tibet—the glorious Himalayas.

The great Indian rivers, the Indus and the Brahmaputra, rise close together in the southern valleys of Tibet. Then flowing on, one west and the other east, they break through the Himalayas in grand gorges more than a thousand miles apart on their southward search for the sea. The most fertile part of Tibet is in the upper part of these rivers and of other rivers that flow eastward to China. On the high plateau dotted with lakes the people rear large herds of sheep and mountain goats. Yaks carry burdens over the difficult and dangerous mountain passes.

A LAND THAT IS GUARDED BY GLITTERING RAMPARTS IN THE CLOUDS

Tibet is one of the most extraordinary countries in the world, and its history and present state are chiefly owing to its position. It is like a citadel strongly guarded by glittering icy ramparts in the clouds.

For a long time Tibet was little affected by the wars and migrations and changes that went on in the rest of Central Asia. From hunters its early people developed into herdsmen, with yaks to carry their loads as they wandered about. Later they began to cultivate the soil where rivers made it possible. As they became more civilized their power grew so much that they became formidable enemies even to China.

In the meantime a wonderful invasion was taking place in Tibet, and, indeed, it is the only one that has really mattered in the country's story. That ancient and wonderful religion of India, Buddhism, spread by slow degrees over Tibet. In the course of time, as its influence lessened in India, it increased in Tibet, till at last that isolated and mysterious coun-

try, of which the outer world has always known so little, became its chief headquarters. Naturally Tibet shared to some extent in the convulsions that shook the old Chinese empire to which it was eventually attached. But outside worldly matters seemed to pass unheeded by the Tibetans as they became more and more absorbed in their religion and its observances.

How the British entered Lhasa, the mysterious capital of Tibet

Many travelers have of late years been turned back from Tibet, for the Tibetans share the Chinese dislike of foreigners. However, in 1904 a British force, sent to settle some trade arrangements, succeeded in entering Lhasa, the capital. Under a new agreement a British agent now lives in the country and may, if he thinks it necessary, visit the sacred city Lhasa with his escort. Tibet is ruled by the Dalai Lama, through a regent who is assisted by five ministers. The Dalai Lama is the leader of the Buddhists in Tibet. Tibet belongs to China in name, but at the time of the Chinese Revolution in 1911 the Chinese troops were driven out by the Tibetans. And China has never been able to force the Tibetans to let a Chinese garrison re-enter the country.

Thousands of Buddhist pilgrims from China and India wend their way to worship at the holy city of Lhasa and to reverence the Dalai Lama. He lives a short way from Lhasa in a mysterious huge white palace on the crest of a hill, the centre part a blaze of crimson, the roofs of glittering gold. Who can tell of the treasures inside, brought by the devout pilgrims from the rich East?

It is said that in Tibet there are twenty thousand priests, or monks; in one monastery alone, near Lhasa, there are six thousand. Every family has at least one son a priest. This being the case, it is scarcely to be wondered at that the spirit of devotion to the religion of Buddha has very deeply influenced the Tibetan people, who have so little intercourse with the outside world that holds such different opinions from their own.

A land of many prayers, where men worship by machinery

Religious inscriptions are seen on the rocks, houses and temples. Prayer-wheels, turned not only by hand but by wind and water, reel off prayers to God amid the flutter of praying-flags. When the day is ending, and the dark rocks stand out grim against the sky, all work stops, the people gather in the squares and open places, and throwing themselves on the earth, chant the evening prayers. Very different has been the story of Afghanistan, on the other side of the Pamirs. Through the Khaibar Pass, thirty-three miles long, and in parts only from fifteen to seventy feet wide, many conquerors have marched to the rich plains of India. There have been numerous fights and struggles about other passes and the chief towns—all keys to India—as well as stations on the old caravan routes to French Indo-China and Persia.

Afghanistan has had its share in all the devastations and conquests of the centuries, for Arabs and Turks and Mongols have swept across it in turn. For a time, as we know, its Mongol rulers were supreme both in Persia and India. Then their power was lost, and the hardy Afghan mountaineers became independent once more in the middle of the eighteenth century.

The British have bitter memories connected with many of the towns and passes. In 1842 a British army of 4,500 men, with 12,000 followers, left Kabul to retreat to India through the snowy passes which it commands. One man alone survived the constant attacks of the Afghans and the hardships of the way. He stumbled into Jellalabad on his exhausted pony, fainting, and hardly able to tell of the disaster and the fate of his companions. Later ninety-five prisoners were recovered from the Afghans. Of this large army 690 were Europeans; the rest were Asiatics.

The famous march of Lord Roberts from Kabul to Kandahar

In August, 1880, Lord Roberts made his famous march of 313 miles in twenty-two days from Kabul to Kandahar, to restore order after the risings and losses following the settlement of the frontier boundaries.

If we turn to page 84, we read the story of Marco Polo, the Venetian boy of fifteen who walked to China in the thirteenth century. He was twenty-one when he reached the end of his journey. After a stay at Ormuz, finding it impossible to go on by sea, the boy, with his father and uncle, went north through Persia and Afghanistan.

Here the party had to rest a while on account of Marco's illness. He greatly

enjoyed the fine mountain air and scent of the pine groves as he was getting better. Then, by the upper Amu Daria, formerly called the Oxus, the party pushed up to the Pamir Plateau itself, and then descended on Kashgar, Yarkand and Khotan. The Tarim basin was next crossed to Lop Nor. Finally, by the route to the north of China, the city of Peking was reached at last. These regions were closed to foreigners soon after this wonderful journey, and they were not described again by Europeans until six hundred years had elapsed.

We have found much to think over while looking at the map of the heart of Asia, and while following the footsteps of the brave travelers who have faced its mysteries and dangers. We have realized, too, whence came the streams of conquerors into Europe—the conquerors whose names and deeds and personal appearance are familiar to us. And yet we have still many questions to ask.

This strange scene is to be witnessed at the beginning of spring all over Tibet. The country is full of monasteries, and at the religious festival of spring the lamas, or monks, wear strange and hideous masks, in striking contrast to their gorgeous silk robes. The monastery in this picture is the one at Himis.

What of those peoples that in the distant past spread over India and Europe, and left traces of their ways of life and of their thoughts in words that have been handed down through countless generations? Where was their first home, and why did they leave it? No one yet knows, though explorers and lovers of the study of Mother Earth's secrets, and of the languages spoken by her children, are all trying to find out. Some men who have studied this question say that perhaps a great open sea once glittered in the sunshine, where the vast plains of Siberia now lie in swamps, with great salt inland lakes, such as the Caspian and Aral, that were left behind when the rising land pushed the ocean ever farther north. The woolly mammoths imprisoned in the ice tell of such mighty and overwhelming changes. So, perhaps, what is now the dry and sandy heart of Asia was once a forest-covered seaside land, tempered by refreshing breezes that brought rain and moisture to a country that was not nearly so high as the "Roof of the World" is now. For when the bed of the northern ocean rose, the mountains and plateaus may have been pushed up, too, so that river basins and courses were completely altered. And the climate, instead of being pleasant and temperate, became one of great extremes in heat and cold.

Perhaps it was changes such as these that may have driven the early peoples of what is now Central Asia to the plains of India, and ever farther across Eurasia. Some day explorers will find out the real facts.

THE NEXT STORY OF ALL COUNTRIES IS ON PAGE 6669.

WHAT THIS STORY TELLS US

FEW of our modern inventions give more pleasure than the moving pictures. We learn below how the pictures, thousands of them, are made on a little strip of film and then are magnified as they are thrown upon the screen. How all this came to pass is a long story, and the steps have taken many years. The moving-picture business, unknown a few years ago, now employs the service of thousands of men, women and children, and many animals, and affords amusement and instruction to millions. A single reel which is shown in twenty minutes or less contains about 16,000 separate pictures only an inch wide and less than an inch high.

MAKING MOVING PICTURES

CONTINUED FROM 6455

YOU all know what moving pictures are. You think you know all about them, for you have been to the big halls or theatres where wonderful pictures of all sorts are flashed upon the big white screen on the stage, and where people and animals as large as the real ones move quickly before your eyes almost as if they were alive. You all like the "movies," as they are sometimes called, but perhaps only a few of you ever think how the wonderful pictures are made.

It seems very strange that a strip of little pictures three-fourths of an inch high and an inch wide can be flashed on a screen making the people and animals and other objects it shows as large as life. Perhaps you wonder that a camera, little pictures no bigger than postage stamps, and an apparatus called a projecting machine can do this wonderful thing; but it is just the combination of these three things that makes it possible.

You see, a long time ago—up to about 1839, in fact—no one knew much about taking pictures. The art of photography was just beginning to be understood, though no one had then tried to do more than take a picture of an object standing perfectly still. Up to that time, to get a faint picture of such a simple thing as a tree in the garden, a time exposure of six hours had to be made before the plate in the camera would record an impression. Those of you who have cameras of your own will appreciate this, for it seems hard to believe now, when an excellent picture of almost anything can be made by an exposure of a very small part of a second.

In 1839 two men—Daguerre, a Frenchman, and Talbot, an Englishman—who had been studying the making of pictures, with the idea of making them better, announced that it was possible to do wonderful things with a camera, and that a picture could be made in a few minutes. The first picture of a person was made in New York by Professor John W. Draper. Almost immediately other experimenters were able to shorten the time to seconds.

To take a picture in a few seconds! That seemed a wonderful thing to the photographers of those early days. The time exposure had been reduced from six hours, or 21,600 seconds, to a few seconds—three or four—and then the effort was to reduce the time still further, as well as to make plates easier to handle.

In the end it was a chemist who found the way. He experimented in his laboratory until he produced a plate so sensitive to light that it would take a picture "clear, distinct and full of detail," in an instant, better than the one which had taken an exposure twenty thousand times as long. Anyone with a camera and this new kind

of plate could take a picture of a horse jumping, a bird flying or a man walking along the street, so quickly that you could hardly know it was being done.

How horses took their own pictures

Then certain other men began to study this new way of taking pictures, and they said that if it was possible to take a picture of a horse jumping a fence or a bird alighting on a tree, it was possible also to take pictures showing every motion made in any act. A man named Muybridge, living in San Francisco, was very much interested in this idea, and tried to see what he could do.

In 1877 or 1878 he built for himself a photographic studio near a famous race-track, put up a big white screen a little distance away from it, and placed twenty-four cameras in a row, with twenty-four threads stretching across the track between the studio and the screen. Each of these threads was connected with a spring which held the shutter of a camera in place. When a horse, walking or galloping on the track, passed near each camera, it broke the thread holding the shutter, and released the spring, thus actually taking its own picture. The great French painter Meissonier was much interested in this odd manner of photographing a horse in motion, and did all he could to help make it a success. Several questions which had been in dispute were settled by these pictures.

A new kind of camera is invented

However, other men who had been working on this problem thought it too troublesome to use twenty-four cameras to take pictures of objects in motion, and they decided to experiment in taking pictures with one. They found almost as many difficulties as the earlier inventors had found, for they wanted to make the method as simple as possible and yet gain the best results. They had the right idea, but there were many obstacles in the way of their carrying it out. Not only did the chemist have to invent a new sort of plate easier to handle, but the mechanical engineer, the optical-instrument maker and the lens-maker had to plan how they could make this special kind of camera which was to take dozens of pictures one after the other with only the smallest space of time exposure between.

The celluloid film solves the problem

It was the chemist who found the way again. But about this time, in 1888, roller photography, in which a length of prepared paper wound upon a roller is used instead of a plate, was introduced by Mr. George Eastman, of Rochester, New York, and to meet the demands of this new sort of photography a transparent base or support to take the place of the glass plate had to be found. It was a difficult task, and Mr. Eastman worked on it for four years. Then one day a chemist happened to show him a thick solution of gun-cotton in wood alcohol. The appearance of the mixture caught Mr. Eastman's eye, and he commenced to make experiments with it. A clergyman, the Reverend Hannibal Goodwin, was also working upon this idea, and, indeed, seems to have succeeded first.

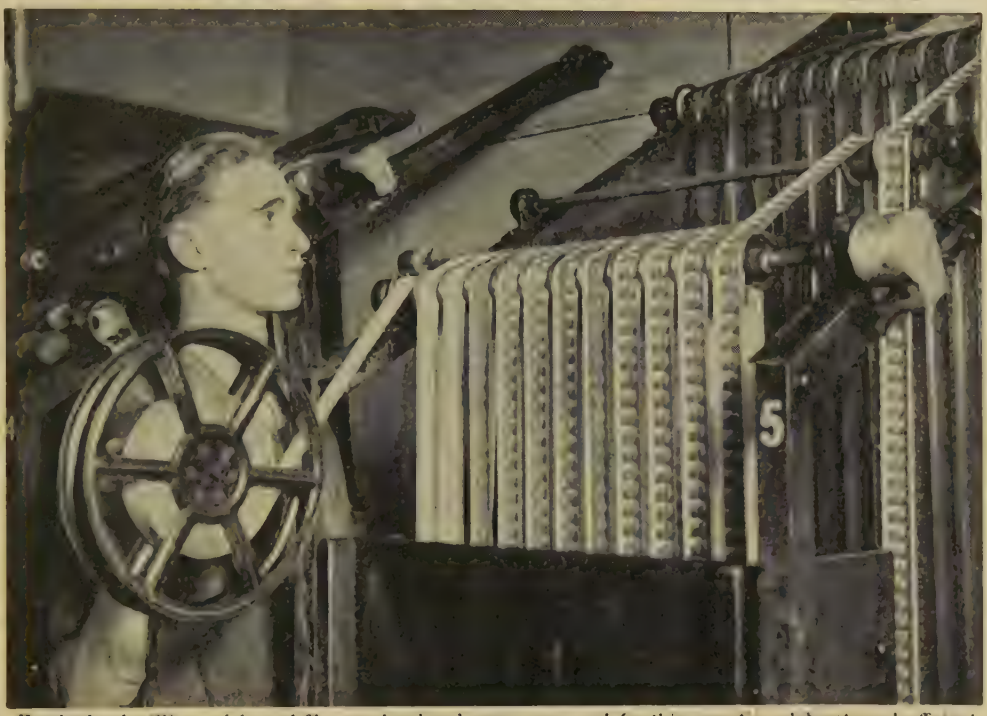
The solution could be made as transparent as glass, and by careful chemical treatment could be reduced to a liquid something like extracted honey. In making the celluloid film this mixture was poured upon polished supports, where it spread out in a thin film and was allowed to dry. The thin coating of transparent, flexible material was then stripped from the supports, coated with a sensitive mixture and permitted to become dry and hard. It was then cut into sheets about three and a half feet wide, and then into strips of film. Then began the great craze for "Kodaks," as the first cameras using this film wound upon spools were called.

Thomas A. Edison takes the next step

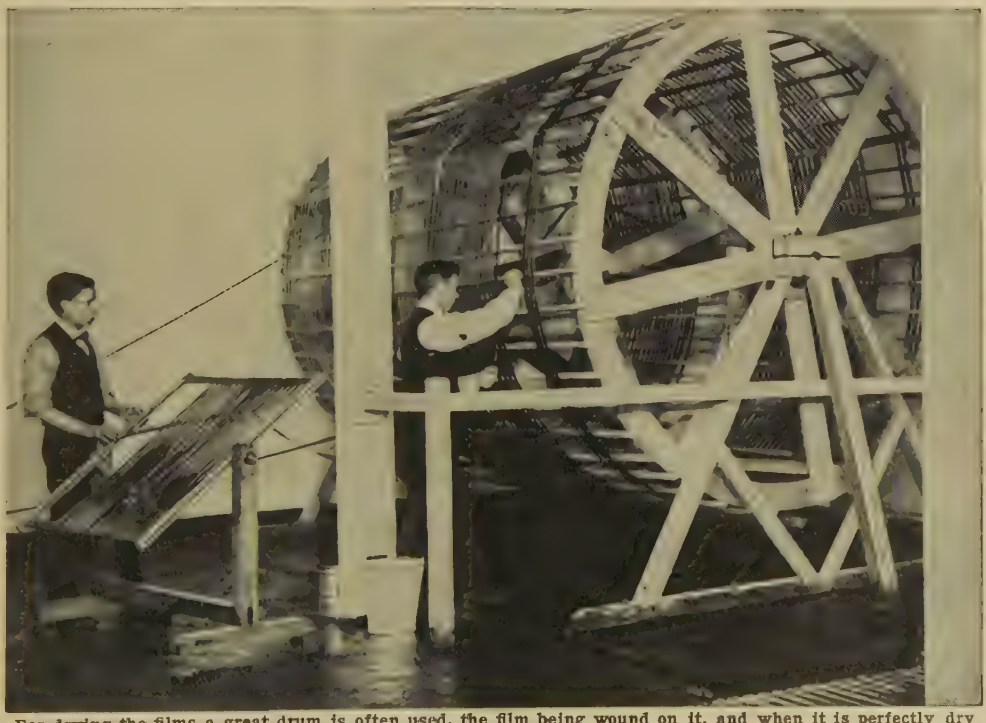
In 1893 Thomas A. Edison patented the kinetoscope. The film was used in a box, but the light behind was not strong, and to see the picture one looked through an opening in the box. Only one person at a time could see the picture, and the machines were seen chiefly in public places beside slot machines. No one paid very much attention to them.

Finally an Englishman got the idea of throwing the picture on a screen so that many could see it at the same time. With the help of the new film they succeeded, and were now able to secure a long strip of pictures following each other in proper order, and these pictures were taken at such short intervals that, when

DEVELOPING AND DRYING THE FILMS



Hundreds of millions of feet of film are developed every year, and for this operation elaborate and efficient machines are used. Here the film is being fed into the machine which completely develops it.



For drying the films a great drum is often used, the film being wound on it, and when it is perfectly dry it is wound off again and rolled up on reels.

thrown upon a screen and passed swiftly before the eyes, they produced the effect of motion. So the name "moving pictures" was born.

Each of these tiny film pictures is a little less than an inch wide and is three-quarters of an inch high. It takes dozens of them to show a hand being raised to scratch a nose. In each of the "single-reel" pictures you see at the "movies" there are about a thousand feet of film. Each foot contains sixteen of these tiny pictures which flash so rapidly on the screen that in less than twenty minutes sixteen thousand pictures pass before your eyes. Every picture remains on the screen a little more than one thirty-second part of a second, and between two pictures there is less than one thirty-second part of a second of darkness. Therefore, before the impression of one picture is gone another takes its place.

We do not realize, however, that the picture has changed, for an impression made on our eyes remains for about two forty-fifths of a second after the object which made the impression is gone. This is what the scientists call "persistence of vision." When a powerful light is thrown on the little strip of film, which has been made very sensitive to light, a lens in front of the big projecting machine, which is what flashes the pictures on the screen, greatly magnifies the picture. This makes people, animals and objects as natural as in life.

Here is a bit of film, exact size, showing longshots, semi-longshots, semi-close-ups and a close-up. Holes on the sides keep the film straight on the reel.
Photo, courtesy Fox Film Corporation.

NO MOTION IN "MOVING" PICTURES

Suppose a picture thrown on the screen shows a man walking along the street. To get this simple action hundreds, sometimes thousands, of little pictures are taken with the special "movie" camera. The first may show the man with his left foot in the air as he is about to step forward. The next picture shows the man with his left foot perhaps an inch lower, the next with his foot an inch lower still, and so on, until you see a picture of the man with his left foot on the ground. All these pictures have followed each other on the screen so swiftly that you believe the man has just placed his foot on the ground. But moving pictures are not really motion at all. All that happens is that a long string of snap-shot pictures, shown at intervals of less than one thirty-second part of a second, are thrown on the screen and pass with great speed before your eyes.

Now, if these pictures were thrown on the screen at the rate of only one per second, they would be like those of an ordinary magic lantern; but as the moving-picture operator turns the crank of his machine faster and faster, the figures in the pictures begin to jerk their limbs this way and that, just as if someone were pulling them by strings. When the operator gets just the right speed, the figures lose their dancing, jerky motion, and walk and act as people do in real life.

Pictures taken of things in motion are really taken when the object is holding itself still. Suppose you see a horse in the act of jumping over a fence. Although every muscle in his body seems to be in action, and looks so in the picture thrown on the screen, the picture is really taken at the instant of time when he is perfectly still in the air right over the top of the fence. It is the same when he appears to be trotting. The picture showing

the motion is taken when one or more of his feet are at one of two resting points—either just before the beginning of the movement, or at the final point, just after the movement has been made.

How the Moving-Picture Plays are Made

The first step in the making of a moving-picture play is to choose the plot, or "story," which is to be acted. Outlines of plots, which are called scenarios, are sent in by outside people, or someone in the editorial rooms of the moving-picture company writes them. Every moving-picture company has its own actors and actresses, one or more stage directors, its property men, its electricians, carpenters and stage hands. The names of some of these actors and actresses are very familiar to you. You have seen many of them on the screen and have learned to know when your favorite actor appears. Some of the most famous actors and actresses in the world have appeared before the moving-picture camera. Even the famous French actress Sarah Bernhardt acted before the machine in several plays.

After the plot has been decided on, the director of the company gives the different members their parts. Everyone must be skillful in the art of "making up," for a young man may enact the part of a gray-headed father, a young woman the part of a witch, and a young girl the part of a little child.

When the different parts, or rôles, are given out, the property man selects the right furniture and costumes from his immense room. In this room, which resembles a junk shop, are stored thousands of costumes—everything, in fact, from a pair of Cinderella slippers to an emperor's robes. The carpenters busy themselves building houses, interiors and shops as settings for the different scenes, and the electricians look after their powerful lights, for indoor pictures are taken by artificial light.

How the Pictures Themselves are Made

If the picture is an indoor one, it is taken in what is called a studio—a big, barn-like room where actors and actresses, dogs and horses, trained mules and tame snakes, animals and stage furniture crowd together in great confusion. The director explains what is to be done, and when all is ready for the rehearsal of the first scene he takes his stand, watch in hand, beside the camera. "Go!" he calls, and the actors begin to act, the director watching them as a cat watches a mouse. "Lively there," he calls to a man whose part demands that he shall fall off a chair. "Don't slide down. Fall—fall hard!" And to the big comedian in front who has to furnish the fun, he shouts, "Now laugh; laugh as if you meant it. Laugh hard!" To the excited woman who wants to make trouble for everybody in the picture, he says, "Look crosser. Wave your arms. Get excited. Shake your fist. Good! That's the idea!" And so, even showing them himself how it should be done, he gets his actors to the point of excellence where the picture is ready to be taken. Often many hours are devoted to rehearsal before the director is satisfied. Then he calls "Camera!" and the camera-operator in the foreground begins to turn his crank.

The Moving-Picture Camera, which Takes the Picture

The camera has three chief parts. Two square compartments in the back hold the film boxes—one containing the unexposed, the other the exposed film. The camera works on the principle of roller photography. It has a large lens in its front part and a screw for focusing the picture. The film, coming from the unexposed film box through a narrow slit, passes under a small guide roller, then upward over a second roller, and down again under a sprocket wheel. Each film picture has four tiny holes on each side, and the teeth of this sprocket wheel exactly fit into these little holes, and serve to guide the film forward. The film now passes upward from the sprocket wheel, and is kept in place by another guide roller which presses lightly upon the film to keep it in contact with the wheel. Now the film passes behind the lens for exposure, during which instant the picture is taken, and then passes downward and goes into the lower film box, where it is wound on a bobbin, or reel.

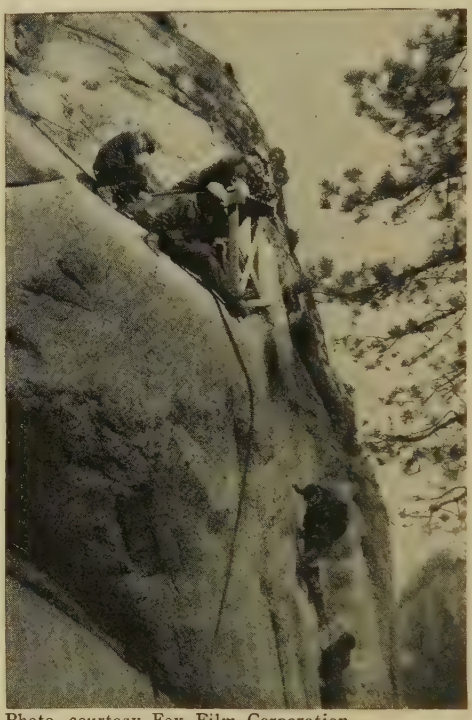
How the Cooper Hewitt Lights Help

Indoor studios are fitted with extremely powerful lights. Some studios have on or near the stage great stands of lights which look like huge toast racks. These are known as Cooper Hewitt lights, and are really long glass tubes containing mercury, and from which the air has been exhausted. A current of electricity

is conducted through these tubes, and the mercury vapor becomes incandescent. The tubes look like white-hot icicles, and throw a curious green light over everybody and everything, while the big flaming arc-lights hanging from the roof nearly blind you with their fierce glare.

These powerful lights shine directly on the scene, and while the operator turns the crank of his machine the film inside is rapidly moving and recording the images of all of the actors. When the actors have finished the scene the director calls "Camera!" and the crank stops. The picture of that particular scene has been taken, and the director and his company are ready for the next.

Some of the scenes may be taken in the open air, showing forests or mountains for a background, or perhaps a street scene may be introduced. A picture of a crowd or a procession is often taken by several cameras stationed at different places, and then parts of the films or the whole films are joined together in one reel. Some pictures of the Civil War were taken on the actual battlefields. Sometimes actors are sent to Europe, or even to Asia and Africa, in order that the scenes where the action is supposed to take place may be correct.



Photo, courtesy Fox Film Corporation.
Some of the thrilling films are taken by courageous operators who run great risks, as this shows.

You all like cowboy and Indian pictures. In some of these the acting is most realistic, the actors actually tumbling headlong from bucking ponies, dashing over rocks, and climbing trees post-haste with the supposed enemy after them at full speed. Many of the outdoor pictures are taken in southern California or Arizona, because of the clearness of the air and the few cloudy days. Then, too, the climate is such that picture-making can go on all the year round.

WHAT HAPPENS TO THE FILMS AFTER THEY HAVE BEEN EXPOSED

The films of the different scenes, now carefully protected from the light, are taken out of the camera, placed in round flat tin cans, and taken to the dark room, where the negative is developed and a print made, or else it is thrown upon the screen in the editorial rooms, where it is edited just as a story would be. This means that all unnecessary parts are cut out, the scenes are made to follow each other in proper order, titles and explanations are put in, and the revised film itself is thrown on the screen for the final criticism.

Often some parts must be done over several times. Very often the parts of the picture are not made in the order in which they are to appear. When everything is as it should be, this revised negative goes to the factory, and from it are made the hundreds of copies which go to the moving-picture exchanges to be rented to the theatre managers all over the country. So now when you see your favorite film thrown on the stage, you will have a fair idea of the process by which it came there.

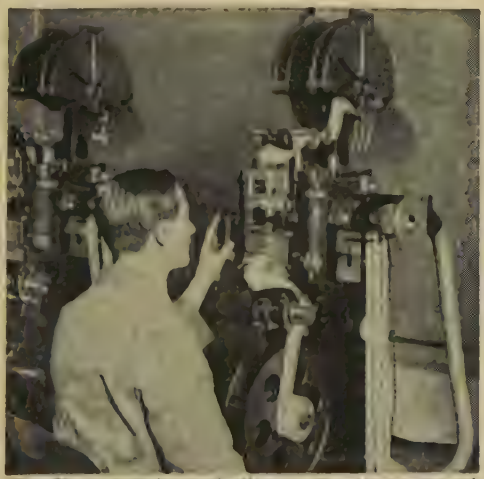
The discovery of the celluloid film is what enabled Thomas A. Edison, "the wizard of electricity," to complete the kinetoscope, the first commercial invention to show men and animals in natural movement. Since then many patents have been taken out by different inventors.

THE FIRST COLOR PICTURES CALLED KINEMACOLOR

Kinemacolor was a name given to moving pictures in color produced in a particular way. Before this process was discovered everything pictured on the screen was in black and white, and no one realized that a moving-picture camera could take people in a pink-and-white

THE FILMS ARE READY FOR THE SCREEN

Many films are stained with color to give moonlight and other effects, and in this picture we see the apparatus which automatically washes and stains 4,000 feet, or nearly a mile, of film at one operation.



The films used for projecting on the screen are, of course, positives, and these are printed from the negative film. The chart regulates the light.

The last operation in preparing films for the screen is to measure off the right number of feet and to pack them in tins ready for the picture theatres.

apple orchard or a lovely red rose garden, and reproduce them in all their natural colors. But men continued to experiment with color photography, and someone thought out the idea of taking first one picture on the film through a red-glass screen, or color filter, as it was called, the next through a green filter, and so on through alternate red and green screens.

This was the idea used in the pioneer color process, Kinemacolor. However, Kinemacolor did not prove adaptable to the quick projection necessary in the movies. A new process, the Technicolor process, is a recent discovery and has been used with much success.

It is necessary in taking all color pictures at the present time to take two pictures of the scene, one through a red glass and one through a green glass, and these must be placed upon each other either on the screen or on the film itself. The principal difficulty with early processes was that the red picture and green picture were taken one after the other in alternation and therefore the object photographed had a chance to move between the taking of the two pictures and consequently they could not be made to superimpose accurately on the screen. The engineers discovered a method whereby light could be admitted through a single camera lens and then split up without distorting or blurring the images, so that the two pictures could be simultaneously impressed on the film side by side. Under these circumstances the two pictures are taken through the same lens at the same instant. The distressing "fringe," or overlapping of color edges, is therefore completely eliminated. It is claimed that before the invention of the Technicolor system this result had been generally supposed to be impossible.

Having made this discovery, the engineers built a camera along these lines and attempted to take pictures with it. Very soon they ran into the second difficult problem, namely, that no film could be found on the market which was sensitive enough to give a good picture except in the brightest sunlight. For example, if a girl wore a sunbonnet, the bonnet itself would appear clearly and perfectly on the screen, but her face in the shadow was entirely unrecorded, and the audience saw in its place a black spot without detail. It then became apparent that a research would have to be undertaken to produce a film of greater sensitiveness. The problem was undertaken in the face of widespread expert opinion, both in the United States and Europe, that such a film could not be made. The engineers, however, were not discouraged, and at the end of many months of work they succeeded in developing an entirely new principle in preparing films. They started with ordinary black-and-white film and put it through a newly discovered chemical process which produced a film many times more sensitive than any procurable. By the use of this film the girl's face under the sunbonnet came out clearly and had the same appearance as when viewed directly by the eye.

Another extremely difficult problem which Technicolor had to meet before perfect color moving pictures could be produced, was the problem of superimposing with the necessary accuracy the two component pictures in a way which could be commercially carried out by machines handling thousands of feet of film. The Technicolor engineers finally succeeded in developing automatic registration.

THE SILENT DRAMA OF THE MOVING PICTURES

You see people move their lips in the moving-picture show, but no sound comes from them. You watch horses trot, gallop and canter, yet you hear nothing. Moving pictures are the art of the silent drama. They are the art of expression, but without one of the most important means of expression—the voice.

Such is their popularity that in the United States 55,000,000 people weekly attend the moving-picture theatres. It is estimated that paid admissions to the films amount to $550,000,000 annually. And the capital invested in the various branches of the industry is reckoned at $1,250,000,000. In the United States alone about 35,000 people are employed in the production of moving pictures and about 160,000 in their distribution and exhibition.

Moving pictures, however, now enjoy a world-wide audience and popularity. It is difficult to find a place in the entire world where the natives have not seen a movie. In darkest Abyssinia, in the South Sea islands and in Mozambique movies are popular. In Europe and South America the films have attained a tremendous hold with the masses, and

HOW SOME OUTDOOR FILMS ARE TAKEN

In many film plays where snow scenes occur, the snow is artificial. Here is a realistic picture of a dog sleigh, but for the snow fifteen tons of salt were used, and for the ice 800 pounds of paraffin wax.

Often in a film we see a picture of a railway engine traveling at full speed with the country rushing past at the back. This shows how such a film is taken, the camera men being on a platform on the engine.

most of the large European nations, including England, France, Italy and Germany are making their own pictures now in an endeavor to compete with the American movie product. The fame of Gloria Swanson, Harold Lloyd, Douglas Fairbanks, Mary Pickford, Charlie Chaplin, Betty Bronson, Thomas Meighan, Richard Dix and other noted actors and actresses of the movies is now world-wide.

Some of the tremendous moving-picture productions of recent years have cost more than $1,000,000. Perhaps the costliest photoplay ever screened was The Ten Commandments, made by the Famous Players–Lasky Corporation. This picture cost $1,800,000. Enormous sets were constructed to represent the palace of Pharaoh in ancient Egypt, a modern cathedral of to-day and other big undertakings. Thousands of extra actors and actresses went "on location" in the California desert for weeks to impersonate the children of Israel. Another great picture is The Covered Wagon, which narrated in pictures the pioneer settling of the West.

Photo, courtesy Fox Film Corporation.
The difficulties which sometimes arise in making a moving picture of a street scene.

In their search for the best material the moving-picture producers have ransacked the libraries of the world to find suitable stories to film. Almost every famous novel or play that would lend itself to translation upon the screen has been picturized.

How trick pictures are sometimes made

Trick pictures are often made by the use of dummies made up to resemble the actors, which are introduced at the proper time. For example, some of you may have seen a picture of what seemed a terrible accident. In such a case, just as a motor car, perhaps, was about to strike a man the camera was stopped and the dummy was substituted. Perhaps the car ran over him and seemed to cut off his legs. These were made to move about by means of invisible wires. Then the doctor came and brought the legs into proper position. Here the camera was stopped again, the actor took the place of the dummy, sprang up and danced about when the camera was started.

Perhaps you have seen a picture in which a coffee pot seemed to pour itself, lumps of sugar jumped into the cup, and so on. Generally these were managed by wires too small to be seen. Sometimes actions seem to take place backward. This is done by winding the film backward for a little while, by turning the camera upside down, or by a special printing machine.

There are many thousand moving-picture theatres in the world. Can you imagine what the pictures shown in them may do in time to come? They may teach history and geography by pictures instead of books. Very often, nowadays, moving pictures are made of important events, and copies of the film are stored in safe places. Fifty years from now people may be able to see exactly how people of the present look.

Some day the pictures will flash before you the great events of the world almost as soon as they happen, when sending pictures by telegraph has been perfected. Then, too, Mr. Edison and other inventors have been working to join the talking machine and the pictures.

THE NEXT STORY OF FAMILIAR THINGS IS ON PAGE 6745.

A SCENE FROM QUEEN ELIZABETH AS PLAYED BY SARAH BERNHARDT

Some of the greatest actors and actresses of the day have appeared before the camera. Sarah Bernhardt, the great French actress, and her company are here shown in a scene from Queen Elizabeth. For this play all the stage settings were made with great care, and the costumes were rich and appropriate. The play was so well done that one hardly realized that no words were spoken. A hundred years from now people will be able to see the acting of to-day by means of the films which will be preserved. Without them descriptions could give only a faint idea of how the actors and actresses played their parts.

AN OLD CITY BUILT FOR A FILM PLAY

Here is a remarkably realistic photograph of life in the old city of Toledo, Spain. The picture was taken in America, and the city which we see is not the real Toledo, but a city specially erected for the film.

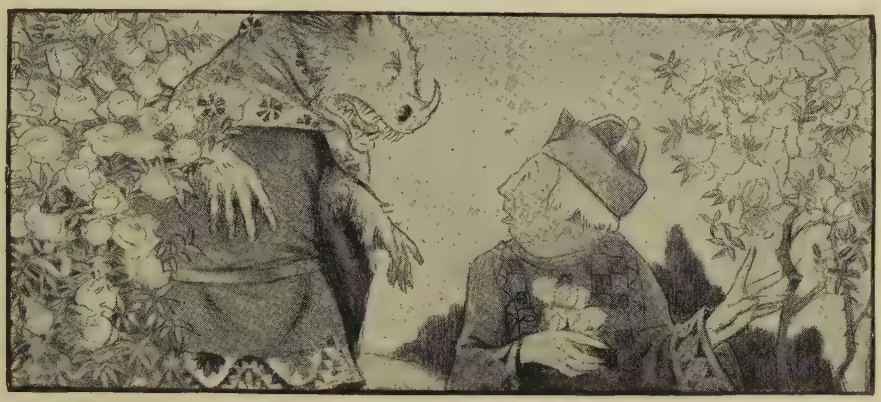
Before such a piece of scenery is built up, a model is made, and this picture shows the model of old Toledo. On the left is the artist who planned it, and on the right are the producer and the chief actress.

A WONDERFUL SETTING FOR A MOVIE

A wonderful representation of Monte Carlo built up for the background of a film. Note that the buildings have no backs.

The Covered Wagon tells the story of the trek of the pioneers across the country to the Pacific coast in 1849. The long trains of covered wagons were the only means of transportation in those stirring days, and our picture shows a trek across such country as the pioneers crossed in their exciting and perilous journey.

This striking scene is from the impressive film The Ten Commandments. It shows Moses (acted by Theodore Roberts) at the Egyptian court being lashed by Pharaoh's son. Photos, Paramount Pictures.



BEAUTY AND THE BEAST

CONTINUED FROM 6507

A RICH merchant had three daughters. The two elder ones were cross and ugly, but the youngest daughter was so sweet and lovely that she was called Beauty. But the day came when the merchant lost nearly all his money. He had to sell his grand house and go to live with his daughters in a little cottage. He was too poor to keep any servants, but Beauty willingly undertook all the work of the house, and even tried to find excuses for her lazy sisters when they stayed in bed till quite late in the morning and allowed her to wait on them all day long.

One day, while the merchant worked in his garden, a letter was handed to him. He opened it and learned that if he could go to a distant town he would be able to obtain work. Overjoyed at his good fortune, the merchant embraced his daughters, and prepared to set out.

"What shall I bring you when I return?" he asked Beauty.

"I want a new dress," cried both the elder daughters before Beauty could answer.

"I will bring you the best that I can afford, my daughters," replied the merchant. "And you, Beauty, what would you have?"

Beauty knew that it pained her father to feel that he no longer had the means to buy costly presents for his children, so she said quietly:

"A rose, father, just a beautiful rose, if you can find one," thinking that such a present would cost him nothing.

So the merchant set out, and after traveling for a whole day reached the town to which he was journeying, and received his orders. The following day he prepared to return, but he had not gone far when, to his dismay, he discovered that he had taken the wrong turning. He was in the midst of a huge forest, and knew it was very unlikely that he would meet anybody of whom he could inquire his way.

After searching in vain for the right path for many hours, a terrible storm arose, and the merchant, in despair, climbed up into a tree in the hope of finding a light to guide him to some house. Sure enough, he saw a light and, regaining the ground quickly, he leaped upon his horse and was soon before the gates of a magnificent castle.

For a moment he waited, but as nobody appeared, he dismounted and strode up the steps. The house was brilliantly lighted from top to bottom, and on every side were signs of wealth and luxury.

The merchant passed through the great hall blazing with lights, and found himself in a large room. In the centre stood a table loaded with good things, and the merchant, being very hungry, sat down and ate a good meal.

When he had finished, he began to feel very sleepy. Opening a door at the end of the room, the merchant found himself in a comfortable bedroom. He undressed and got into bed, and soon fell asleep.

In the morning, to his intense astonishment, he found a new suit of clothes in the place where he had left his old ones. He thought this strange, but he put them on and made his way to the dining-room, where he found breakfast awaiting him.

When he had finished an excellent meal, he rose and wandered out into the garden. The flowers were magnificent, and the sight of a lovely rose tree reminded him of his youngest daughter's request. Stooping, he cut a lovely bud, and placed it in his coat. Just then he heard a noise, and looking up, found himself face to face with the ugliest man he had ever seen, for, though he had a man's body, the face was that of a beast.

The merchant shuddered.

"Ungrateful man!" roared the Beast. "Did I not feed you when you were hungry, and shelter you for the night? And yet you repay me by robbing me of my flowers. Ingratitude is a sin I cannot pardon; in an hour from this time you must die!"

"Forgive me, I pray you!" cried the merchant, falling on his knees. "I did but pick a rose for my daughter, and could I have found you sooner, I would have thanked you for all your kindness."

After some pleading, the Beast consented to forgive the poor man if he would promise to send in his place the first living thing he saw on returning to his home; and the merchant, hoping that this would be his dog, who always ran to welcome his master long before anyone else had heard his footsteps, gladly promised, and departed.

To his horror, his first sight as he drew near the house was Beauty.

"Oh, what a beautiful rose!" she exclaimed, kissing him.

"Alas!" replied the poor man sadly, "you little know how dear it has cost me." And drawing her to him, he led her inside and told her the whole story.

"What you will do when I am gone, my poor children," he concluded, "I do not know."

"But you are not going," declared Beauty bravely, "for I shall go instead." And in spite of everything that the merchant could say, Beauty insisted on having her own way.

And so the next day they both set out for the castle, where they found a splendid supper awaiting them. They sat down to eat, and had scarcely finished when the Beast appeared. He looked at Beauty, and Beauty lifted her eyes and saw him. She shuddered and moved closer to her father. "What a dreadful man!" she was thinking. "I do hope he will kill me quickly."

But the Beast did not want to kill one so gentle, and he told her father that if he would go home and leave her behind, no harm should befall her.

So the merchant rode sadly away, and Beauty was left alone in the huge castle. But the Beast scarcely went near her all day, and when night came, he showed her a beautiful little room, which he told her was hers. Sure enough, on the door was written: "Beauty's room," and inside was everything she could wish for. That night Beauty dreamed that a fairy came to her and bade her be not afraid, for she was quite safe.

The next morning she rose early and wandered through the gardens, but not one single person did she see. When she felt hungry she went to the dining-room, where she met the Beast.

"Do you think me very ugly?" asked the Beast.

"Well—yes," replied Beauty.

He spoke so gently that she felt quite sorry for him.

The Beast sighed and left her. The next day she met him again.

"Will you marry me, Beauty?" said the Beast.

"Oh, no, no, no!" cried Beauty, for much as she pitied him, she could not bear the thought of marrying him, and the Beast went away looking very unhappy.

Soon after this, Beauty looked into a magic glass and saw that her father was very ill. The next time she met the Beast she begged to be allowed to visit her home.

"If you go away, it will kill me," said the Beast; "but rather than see you unhappy, I would bear any pain. Go, but you must return in a week."

At parting the Beast gave her a magic ring which would take her home and bring her back again when she wished to return, and Beauty was surprised to

BEAUTY SAVES THE LIFE OF THE BEAST

"Oh, you must not die!" cried Beauty. "I will marry you, dear Beast, for it surely is better to be kind and gentle than to have a handsome face." And as she spoke a wonderful change came over the Beast.

find how sad the parting with the great, ugly creature made her.

Her father was so rejoiced to see his daughter alive and well that he quickly recovered, and Beauty was so happy to be at home again that she forgot all about her promise to the Beast. The week slipped by, and then another, until one night Beauty dreamed that the Beast was dead. She burst into tears and awoke. She dressed quickly, and with the aid of her ring was soon back again in her little room in the palace.

She ran out into the gardens, and there, in a swoon, by the fountain lay the Beast. Beauty threw some water upon his face, and presently he recovered. When he saw her, he smiled.

"I could not live without you," he said faintly, "and so I tried to starve myself to death."

"Oh, you must not die!" cried Beauty, wringing her hands. "I will marry you, dear Beast, indeed I will. It is surely better to be kind and gentle than to have a handsome face; and indeed I love you."

As she spoke a wonderful change came over the Beast, and even as she looked he was transformed into a handsome prince.

Beauty was so astonished that she could scarcely believe her eyes. Taking her hand, the young man explained that a wicked fairy had cast over him a spell, which could not be removed till some gentle girl should promise to marry him, ugly as he was.

Beauty's father was overjoyed to hear the good news, but the disagreeable sisters were as jealous as they could be, and said such unkind things to Beauty at the wedding that the Prince turned them into statues, and placed one at each side of the palace gates, where they stand, still and cold, to this day.

THE RIDDLE OF THE SPHINX

THERE was once a King of Thebes, in ancient Greece, of whom it was foretold that he would be killed by his own son. So, when a baby boy was born to him, he had it carried far away to a wild forest and left there to die. But it was all in vain. For Œdipus, as the child was called, was found in the forest by a herdsman and taken to Corinth; and there he grew up not knowing who was his real father. And one day he met the King of Thebes and slew him as a foreign enemy.

Œdipus did not know what a great crime he had committed, and he was surprised to learn that the King of Thebes was dead, and that the crown was offered to any man who could manage to answer the riddle of the Sphinx.

The Sphinx was a strange monster that did great harm to the people. She had a woman's face and the body and claws of a lioness, and she crouched on a hill near Thebes, waiting to kill all the men who should pass by, because none of them could answer her riddle.

But Œdipus did not fear. He went boldly up to her, and said: "What is your riddle?"

"This," said the Sphinx. "There is a wondrous creature, and its like is not found on earth, in air or in water. At first it goes on four legs, then it goes on two, and at last it goes on three."

"Man!" cried Œdipus.

And so it was. In infancy man crawls on four legs, then he walks on two, and when he grows old he uses a stick as a sort of third leg. When her riddle was solved, the Sphinx cast herself from the hill and died, and the grateful people of Thebes crowned Œdipus as their king.

But one day Œdipus discovered that he was really the son of the man he had killed. This made him very unhappy, and he put out his eyes, crying: "I am not worthy to see the light!" Then he gave up his throne and wandered blindly about the country dressed in beggarly rags. But he had a tender and loving daughter, and she went with him and helped him and comforted him.

TOM THUMB

NOT far from Fairyland there lived a man and his wife who were often sad because they had no child.

They looked so gentle and kind-hearted that the wizard Merlin thought he would go and see if they really deserved to be happy. So one day he dressed himself in an old ragged coat and knocked at their door.

"Come in," said the old woman. "Won't you sit down and rest a little? We are very poor, but I am preparing some bread and milk for my husband's dinner, and I will make you some too."

"That is very kind of you," answered the old man, throwing off his cloak. "I am the wizard Merlin who can do all things, and because you have been generous and thoughtful for others I will make you a gift. You may choose what it shall be."

"Oh, please," cried the old woman, "we want a little child! Even if it were no bigger than my thumb we shouldn't mind."

"Very well," said the wizard, smiling, and he went away.

When the man and his wife woke up the next morning there lay beside them a little child, a boy, so tiny that he really was no bigger than his mother's thumb. When the fairy godmother came, she told the old people that he would never grow any bigger. So they called him Tom Thumb.

Tom was so small that his godmother had to call for the help of the other fairies to make him a suit of clothes.

They made him a shirt out of a cobweb, a coat of a beetle's wing, shoes of the skin of a mouse, and a cap out of an oak leaf. When everything was ready, Tom's godmother gave him a little magic sword, which she told him he must always wear.

TOM THUMB BEFORE THE KING AND QUEEN

Tom was a good boy, but he had one bad fault: he was very inquisitive. One day when his mother was making a pudding there came a knock at the door and she went to see who was there. She was away so long that Tom grew tired of waiting for her and began to wonder what was inside the bowl that his mother had been stirring for so long.

He got off his chair, which always stood on the table, and walked round and round the basin, wishing that he could see over the top. By the side of the basin lay a fork.

"Hurrah!" cried Tom, seizing the fork. "This will make a capital ladder to scale the side."

And he climbed up the prongs until he could reach the top of the basin. But even then he could hardly see in, for his head only just reached the top. Still his curiosity egged him on.

"I know," said he, "I'll jump."

Tom put both hands on the edge of the basin and jumped. He jumped once, but not quite high enough; he jumped again, but still he could not see. So he jumped a third time, and this time he jumped right into the sticky batter that was in the basin.

At this moment his mother came back, and taking up the big wooden spoon, was about to stir it again when she saw something moving in the basin. This so frightened her that she took up the basin and threw everything in it as far as she could out of the window.

Underneath the window flowed a river, and as Tom tumbled headlong into it a big fish came swimming by. The fish opened his mouth and in fell Tom.

The fish was caught, and it was so fine a fish that it was taken to the palace for the King's dinner. As the cook cut open the fish, out jumped Tom upon the table. When the King heard of it, he was so astonished that he ordered Tom to be brought before him.

"Where do you come from, and what is your name?" asked the King, putting on his glasses and looking down at him.

Tom told his story, and the King was so pleased that he allowed Tom to stay with him and live in the palace.

It was all very splendid, and for a long time Tom enjoyed himself and was very happy. When the King went for a ride, Tom went too, only, instead of a horse, Tom rode on the back of a great rat.

As they were riding in the forest one day a big cat sprang out, and pouncing on the rat and its rider, carried them off into a tree. Tom took out his magic sword, and after a brave fight he killed the cat. Then he turned and began to climb down the tree. But it was a long way for little Tom's legs, and he had not got far when he felt his foot slipping, and in a minute he would have fallen and been killed. Just then, however, the King missed Tom, and looking around, he was just in time to catch him as he fell.

Tom had had such a fright that when he got back to the palace he felt quite ill and had to go to bed. In the morning the King came to his bedside and found him very miserable.

"What is the matter?" asked the King.

"I want to go home," sobbed Tom.

"Nonsense!" said the King. "You have everything you can ask for, and you ought to be very happy."

"I want my mother. Please let me go home."

"Certainly not!" said the King. "You must stay here till I am tired of you."

"Oh dear!" sighed Tom. "And when will that be?"

"I don't know," said the King. "I like you very much at present."

All that day Tom wondered how he could get away without being caught; and the more he wondered the more miserable he became, and the more he wanted his mother.

He worried so that he became thin and ill, and at last his fairy godmother, thinking that he had been punished enough for his inquisitiveness, determined to help him. So she went to Tom's bedside, and when Tom, jumping for joy, begged her to take him home, she consented. Her carriage, a hollow oak leaf drawn by beautiful butterflies, was waiting on the window-sill. They got in, and away they sailed, over the housetops, till they came to the cottage where Tom lived. The place looked miserable and forlorn, as though the people who lived in it had lost all heart in their home.

When they saw Tom again, his father and mother cried for joy, and they all lived happily together forever.

THE NEXT STORIES ARE ON PAGE 6787.

The fine front of the American Museum of Natural History, New York.

THE AMERICAN MUSEUM OF NATURAL HISTORY

CONTINUED FROM 6436

A VISIT to New York is not complete unless you have seen the American Museum of Natural History, one of the most interesting places in the whole city. Once you have been there, you will want to go again and again, and each time you will come away with your mind stored with some new and beautiful bit of knowledge.

In the first place, it is not in the least like our ideas of an old-fashioned museum, where everything is put in uninteresting glass cases and you have to turn to the pages of a catalogue to find out what they are. To be sure, there are glass cases, but they are attractive cases that frame the objects they inclose.

To each a clear description in large print of the bird, or animal, or other object, is attached, and even a rapid walk through the halls makes you feel as if you were walking through the pages of a fascinating book in which the pictures have suddenly become alive. Its pictures help you to understand many books, and your favorite subjects become doubly interesting after you have paid a visit to this wonderful place and have seen how strange birds and animals look at home.

For instance, suppose that you have been reading stories of Indians, and of life on the plains when they were the grazing-grounds of the buffalo. How much more interesting these stories will be after you have seen a real tepee with life-sized Indians sitting about in it, and how real the stories of buffaloes will seem after you have seen a herd feeding on a real bit of the Texan plain, with a buffalo-path across the corner.

You forget that the Indians are wax figures, and that the buffaloes are stuffed, so lifelike do they seem.

As you go about the halls you will remember all the things that you have learned, and the gaining of knowledge will never seem dull again. Rare birds in their native haunts, with stones and trees about them and a painted background that you can easily think is real, make nature study a pleasant and fascinating pursuit.

In another place you will find birds' nests with the parent birds on the branches beside them. You will find animals in the surroundings in which they lived. Snow-white arctic bears climb about on snow-covered rocks; hyenas look as if they had taken their color from the sand on which they

stand; beavers are busy beside the lake that their dam has made just as if they were alive.

WHERE YOU MAY SEE INDIANS AND ESKIMOS

Four large halls are devoted to Indian life. As you go through the door you can scarcely wait to look at the large meteorites inside it before you press on to see the Indians, of whom you catch a glimpse through the open door beyond. The life of the Indians of the Pacific coast is shown in the long Central Hall. The canoe that you have seen through the doorway is a huge dug-out in which a party of Indians are going to a feast called the "potlatch," during which they will give away all they possess in honor of the memory of the dead. The man who is standing at the stern of the canoe is the medicine-man who is going to direct the ceremony. The canoe, which is 64 feet long and 8 feet wide, was dug out of the trunk of a single tree. It is a good seaworthy boat and will hold forty men.

Against the walls and down the sides of the hall there are cases in which you will see the grotesque-looking totem poles and house poles made by the Indians of British Columbia and Alaska, and in the cases there are specimens of the fine blankets woven by the Chilkat Indians, the baskets for which the West Coast Indians are famous, the masks used in religious ceremonies, and many other interesting things.

At the end of the hall you go into a smaller hall, in which you will see the home life of the Eskimo. In one group an Eskimo woman is cooking blubber over a stone lamp; in another a woman is fishing through the ice. The fur clothing of these people is shown, and so also are their implements and their carving in bone and ivory.

When you leave the Central Hall, turn to the right through the Entrance Hall, to find more Indians. Here there are three large halls devoted to the life of the Indians of the woodlands, of the plains and of the Southwest. In these halls you will find fine wampum belts, stone weapons, rude agricultural implements, wooden and birchbark vessels, wooden trays and spoons. In the hall where the tepee stands there is also a model of the earth-covered houses in which some of the Indian tribes of the plains lived, and in the next hall there are models of the cliff-dwellings, and of the pueblos of which we have read in the story of Arizona, and some beautiful Navajo blankets.

WHERE THE LIFE-STORY OF TREES AND ANIMALS IS SHOWN

On the same floor there is a very fine collection of the wood of American trees. Each tree has been cut so that you can see the bark, the grain of the wood when it is cut in boards, and the rings which show its growth. With each specimen there is also a spray of leaves and flowers and a spray of fruit and leaves, so that the whole life of the tree may be studied. One of the most interesting things in this hall is a cross-section, or slice, of a redwood tree, or sequoia, which was more than a thousand years old when Columbus discovered America. The great trunk was sixteen feet in diameter, and there are pins set in the section to show how large it was at different epochs in the history of the world.

Passing through this hall, you come to a most interesting collection which shows the development of life in the world as we know it, from the tiny ameba, the lowest form of life, up to a man. Some of the minute animal forms of life are shown by exquisitely wrought models in glass or wax, made much larger than the originals so that they may be seen better. Some of the models are the size of a man's hand, with pale tinted tendrils as fine as a hair, which in their natural size can hardly be seen with the naked eye. In the marine collection there are such fascinating things as sea-stars and sea-lilies, corals and sponges. Life under the sea is shown, and you can study the shellfish, crabs and lobsters as they appear in their native haunts. You remember that we have told you of the life of the mosquitoes which cause malaria and yellow fever. Therefore you will be interested in the models of this insect which show its growth from the tiny larva to the full-grown insect.

THE WONDERS THAT MAY BE SEEN ON THE SECOND FLOOR

On the next floor, in the new wing, you will find snakes, lizards and salamanders, cases of birds' nests and eggs. Farther on, the life of the Mayas, of which you may read in the story of Central America, of Porto Rico and of the Mexicans, before they were found by the Spaniards, is shown. Mexican books teach us that

THE MORGAN MEMORIAL HALL IN THE AMERICAN MUSEUM OF NATURAL HISTORY
This valuable array of gems and minerals is given effective display by a carefully planned hall with unobtrusive cases and surroundings. The exhibits are arranged to help the visitor find whatever particular gem or mineral he may be especially interested in.

Here is the hall containing exhibits of the archæology of Mexico and Central America. Many of the great stone monoliths pictured here were found on the sites of the ancient Maya towns of Honduras, buried in the undergrowth of dense tropical forests. The prehistoric picture records on these shafts of stone tell of a people that inhabited America long before the advent of Christopher Columbus.

the Mexicans had invented writing, and here you may see a copy of the calendar stone. Maya sculpture shows us that the Mayas, of whom until lately we have known so little, knew of art, and tells us how far these people had gone in a civilization of which we know nothing.

From this hall you reach another in which you may study the long, slow progress of man from early times. The first rude weapons and implements made by man are shown. Copies of the pictures which the cave-men made in the caves of Europe are here, and some of the pictures that these early men made on bone and ivory. In another room beyond there are copies of cave paintings made by the Bushmen of South Africa; some of the looms that they use in weaving show how they make their cloth, and there are specimens of the cloth itself and of garments made from the cloth in the cases.

Perhaps you have wondered if the stories you have read of the work done by the negro peoples of South Africa could possibly be true. You will no longer doubt it once you have seen their process of manufacturing cloth, the work of their blacksmiths in axes, knives and spears, that is shown in the African Room, and the beautiful ivory work in trumpets, ax- and knife-handles, trays and boxes. Some of the ivory is finely carved, and you wonder why the people who can do such things have still remained a savage people. In this room you will also find many of the animals found in Africa, including a beautiful specimen of that strange animal, the okapi, of which you will see a picture on page 1445.

On this floor you will find the birds of the world. A dodo built up from a skeleton and copied from a Dutch painting will interest you. Ptarmigan in snowy white winter coats; orioles, scarlet tanagers, blue jays, soberly dressed song birds, birds of paradise, snowy white cranes, and hundreds of other birds are all shown here. Beyond these are the fishes, and then comes the Hall of North American Mammals.

In the hall devoted to these animals you will find moose from Alaska and New Brunswick, the buffaloes or bison and the beavers and seals of which we have already spoken. Caribou, musk-ox, and all the smaller animals are shown in something like the surroundings in which they live. On the floor above you will see the gorillas and orang-outans and other apes and monkeys.

Birds that look as if they were alive

On this floor, too, you will find one of the most beautiful places in the Museum, the hall in which the groups of American birds are placed. When you look into the cases in which the birds are kept, you will find it hard to believe that you are not looking through a window at an actual scene. Each case is built up to look like the scenery in which the birds actually live. The man who is in charge of this department of the Museum traveled sixty thousand miles so that he might make this collection. Artists went with him to make drawings of the places in which the birds were found, and from these drawings models were made and pictures painted. The illusion is so perfect that you can scarcely tell where the foliage and trunks of trees or the rocks in the foreground end and where the painted picture begins. The group that shows bird life on Cobb's Island, Virginia, is so real that you almost expect to get a whiff of the salt sea-air. In the foreground is the white, shell-strewn sand, with its straight tufts of grass, and the sea-gulls hovering about. Beyond are the piled-up clouds, and the gray-blue sea breaking in lines of foam.

Where you may picture the lives of the Incas

If you have been reading about the Incas of Peru you will be interested in the hall given over to South America. Here there is a curved stone chair in which an Inca may have sat. There are beautiful cloths woven of cotton and llama's wool and embroidered by the hands of women who had been laid to rest long before the Spaniards came. Here you will find the spindles that held their wool and cotton; the neat work-baskets used hundreds of years ago; the copper needles with which the embroidery was made; the simple looms on which the cloth was woven. There are fine pottery jars and silver vessels which bring vividly before you the lives of those strange people who had worked out a wonderful civilization of their own.

Beyond this you will find the collection which represents life in China before Western civilization began to change conditions there, and the life of the people who inhabit the east of Siberia.

THE STORY OF THE MASTODON

This is a picture of the giant mastodon as he looked when he wandered through the woods of North America about the time that man appeared on the continent. Like the horse, these animals mysteriously disappeared from America, and no one can tell the cause of their disappearance. Like the elephant, they lived on grass and the bark and leaves of trees, and apparently there was plenty of this food to be had.

This skeleton of a mastodon, now in the American Museum of Natural History, was found within fifty miles of the city of New York, where it had been buried for perhaps more than a million years. If, as some suppose, primitive man exterminated the mastodon, he must have lain in ambush for the lordly creatures, which could have crushed him as we would a moth.

In one of the eastern halls on this floor you will find more animals. A curious platypus from Australia is of great interest, and hares changing from white to brown show us how this curious phenomenon progresses. Still more interesting is the model of a huge sulphur-bottom whale which hangs from the ceiling in the centre of the room. This monster, which is seventy-nine feet long, is an exact model of a whale which was captured off Newfoundland.

The collection of insects, which comes next, includes most of these of which we have told you and thousands of others besides. There are cases of beautiful butterflies and moths, and a mourning-cloak butterfly with folded wings, inside a hollow log, shows how a few of these fragile insects sleep through the winter months.

WHERE GEOLOGY IS MADE A FAIRY TALE

Perhaps you think geology is uninteresting, and the life of the earth dull and drab-colored. But suppose you go up to the fourth floor, to the hall that is devoted to minerals. Walk straight down the hall, and at the end you will see a real cave brought from Virginia. In one part of the cave there are beautiful pillars; in another the stone of which it is made looks like folded drapery through which the light shines. Then you remember what you have learned about the action of water dissolving limestone and depositing the salts in another place, and you know that this beautiful thing has been made by the action of water. In the glass cases across the hall you will find specimens of malachite and azurite. You have always thought of malachite as a highly polished, very cold marble-like stone, but here you see something quite different, something that scarcely looks like a mineral. Some of the masses in the cases look as if they were covered with green velvet, others as if they were made of soft green moss; some of them look as if they were covered with grapes, and in some of the pieces the grapes are purple, powdered with green frost. There are exquisite tiny caves in the blocks which look as if they had been made for halls for the fairies, and these little caves were made by the action of water on copper, just as the larger caves were made by its action on limestone. The blocks of malachite were taken out of a copper-mine like the mine of which there is a model in the corner of the hall, which shows how the mine is worked and the ore taken out.

Not far away you will find another hall which glows with the color of precious stones that catch and reflect the light. Here you will find crystals of royal purple amethyst, yellow amber and smoky topaz. There are lovely pearls and brilliant diamonds, and all the other stones of which we tell you in the Story of Precious Stones. More interesting still, perhaps, is the collection of crystallized minerals, in their rough state, which make you wonder at the beauty dug out of the earth.

LIFE AS IT IS LIVED IN THE PACIFIC ISLANDS

Beyond the Hall of Minerals you will find two halls that illustrate life in the Pacific islands. In front of the door a Tahitian fire-walker is walking over heated lava blocks. On one side of him a group is grating coconuts; on the other, a group is weaving mats for a house. In the corner of the room a Maori warrior breathes defiance against the world. In the cases there are royal feather capes from Hawaii, carvings in wood and stone and models of canoes, rolls of cloth and the looms on which it was woven. In another hall life in the Philippine Islands is shown. A woman is weaving at a loom; near by there is a model of a Philippine house, and not far away another house is perched in a tree-top.

FOSSILS OF MONSTER LIZARDS THAT ONCE WALKED ABOUT

We have told you stories of the monsters that lived long ago on the earth, of great mastodons, of monstrous sloths, of great lizards. Here you will find the actual skeletons of the monsters themselves. There is a giant ground-sloth which, it is believed, some of the cavemen of South America tamed long ago; a great sabre-toothed tiger gives us an idea of the terrors which confronted early man; mammoths and mastodons tower above us, and the skeleton of Jumbo is placed here so that it may be compared with those of his giant ancestors.

In the Hall of Fossils you will find the frightful saurians. The huge Brontosaurus, which you will see on page 93, is dreadful-looking, but it was a gentle beast that fed on water weeds, while the frightful Allosaurus, and the still more frightful Tyrannosaurus, were carnivorous. These huge reptiles were not so large as the Brontosaurus, but the Allo-

LEARNING ABOUT ESKIMO LIFE "BY HAND" AT THE AMERICAN MUSEUM OF NATURAL HISTORY

One of the many groups of children from the blind and sight-conservation classes of the New York City public schools who visit the Museum fall and spring to attend talks on nature, geography and history. These talks are given by members of the Department of Education and the Museum staff, and are illustrated by specimens which the kiddies can "see" with their fingers.

Here we see a group of pronghorn antelopes. They have been made to appear just as they do when they march in single file across the plain. The herbage which the animal on the left appears to eat is made to look as much as possible like their natural food. People who can never hope to see wild animals in their native haunts learn a great deal about them from such groups as these.

saurus ate him up, and the Tyrannosaurus ate the duck-billed Dinosaurus. These skeletons were taken from the earth, where they had been buried for millions of years. The bones that had fallen apart were put together, piece by piece, like the sections in a puzzle, and they were set up here to give us an idea of how they looked in life three million years ago. One of the animals actually shows the skin with which in its lifetime it was covered. In another hall you will find skeletons of the horse, and you may trace his development upward from the tiny Eohippus that fled from the giant Tyrannosaurus in the room beyond.

All these things have not been brought together without much work. The man who arranged the American birds traveled thousands of miles in the time that he spent in studying their habits. Years were given to digging up the skeletons of the Eohippus and other horses. Men have risked their lives in the tropical forests of Africa and have made long journeys in many lands that we might have the pleasure of knowing something of those countries and the birds and animals found there.

Children are always made welcome at the Museum, and thousands visit it every year. No matter when you go through this interesting place you will meet children everywhere, eagerly studying the things that interest them and laying up stores of knowledge that will make their lives richer and fuller. To help children who cannot see understand the things about which they read, classes are held for the blind, and the little ones are allowed to hold objects in their hands to learn about them by the sense of touch.

This is not the end of what is done for boys and girls. Pictures for lantern shows have been made, and these are sent to teachers in other places who ask for them to show them to their pupils. It might be said that in this way the Museum brings its treasures to the children in distant cities and in country places who cannot come to see them.

These dolls were made by Hopi Indians for use in their religious ceremonies and afterward became playthings for the children. The Hopi Indians live in pueblos, which are a sort of large apartment houses. The entrance is usually by ladders. The Hopis make pottery, weave, cultivate the soil and raise good crops if the season is favorable.

The American Museum of Natural History has a record of over fifty years of public service. In 1924 no fewer than 1,633,843 persons visited the exhibition halls. There are lecture courses delivered from time to time. The library of the Museum, containing over 100,000 volumes, is open to scientific workers. The popular publications issued are handbooks, leaflets and a magazine.

THE NEXT STORY OF THE UNITED STATES IS ON PAGE 6701.

This lion is not lying on the sand, gazing out into the desert. It is a mounted lion, but has been made to look so lifelike that it seems to be lying in a contemplative mood.

Here is a group of seals. They are made to look as much as possible as if they were alive on the rocks of the Pribilof Islands, where they were captured. The background of the case is painted to look like the sea.

Perhaps one of the most interesting halls in the Museum is the one showing the birds in their natural surroundings. This is a scene from the Klamath Lake Bird Colony, showing white pelicans, California and ring-billed gulls, terns and cormorants, which all nest together on just such rush islets as this.

THE IROQUOIS INDIANS OF NEW YORK

These are the Indians who used to live in New York long before the white man set foot upon its soil. The middle picture shows a warrior, scalp shaven, club in hand, ready for the warpath. The first represents an Indian woman grinding corn to make meal from which she will bake small cakes. The dog, which we see gnawing a bone, was the only animal found domesticated among the Indians. The third figure in the group shows an Indian medicine-man, or priest. It is interesting to know that this particular group of Indians was prepared for the Hudson-Fulton celebration held in New York to mark the hundredth anniversary of the first trip of the Clermont. The Iroquois lived in large bark houses, which were grouped in villages. They knew how to rudely cultivate the ground and grow corn, from which they made bread.

All pictures in this story by courtesy of the American Museum of Natural History.

6622

Photo, Brown Bros. A female stag beetle.

THE GREAT BEETLE FAMILY

CONTINUED FROM 6548

Colorado Beetle.

WE use the word beetle contemptuously, but Mother Nature is fond of these creatures. They are among her most successful creations; hence their multiplicity and their infinite variety of size, pattern, gifts and functions.

In species they outnumber all the backboned animals by two or three to one; in the mass of individuals they are as the sands of the sea. Great Britain, with a climate not favorable for a great variety of species, has between three thousand and four thousand known kinds, which is about a quarter of all her recognized insect population.

We should not be considered unjust to a beetle to say that brain-power is not its strongest point, though instinct in the Order brings wondrous things to pass. It is rather in what they have inherited to fit them for life that the beetles are chiefly distinguished.

They can move their powerful heads more freely than other tiny folk; their external covering is extremely hard as a defense against attack; and they can eat so many things that they are at home practically everywhere.

They are, indeed, one of the most notable of all our groups of natural scavengers; creatures of which we have to take account in balancing the books of human life. We may employ the name of beetle as a term of scorn, but we do not despise powerful enemies, and such we find among the beetles, as well as a host of good and harmless allies.

We have but to remember the noble oak roof of Westminster Hall, which, defying the tooth of Time for eight centuries, fell piecemeal to the jaws of beetles. Let us further recollect that another beetle, if unchecked, would drive potatoes from the list of human foods.

Beetles are four-winged, but their fondness for protective armor has slowly converted the front pair of their wings into horny coverings for the hind pair. The front pair of wings, or wing-shields, meeting as a rule in a straight line down the back, and guarding, not only the true organs of flight, but the soft after-parts of the body, are called *elytra*. We have seen something of the kind in the earwigs.

Not all beetles have them. Some, indeed, are flightless. Generally this is so in the females, where the distinction occurs, but there are kinds in which both sexes have copied the penguin and given up flight, though the elytra remain to show what once they had.

Not only is there great diversity in pattern and proportions in the various species of beetles: there are striking

differences in size in the same species. As species are supposed to be alike, how are we to account for these many differences?

The explanation is that the big beetles have prospered in the larval stage more than the small ones. For food supply and fair conditions govern the growth of beetles as of babies. In a larger classification which includes the whole Order, we find the smallest beetles less than a pin's head in size, and the monsters of the tribes, like the elephant and Goliath beetles, nearly as big as a man's fist, and a South American giant beetle six inches long and nearly as broad.

How shall we be sure that an insect before us is actually a beetle? The head is, as a rule, more broad than long, and sometimes, as in the weevils, shows that Nature has employed here, perhaps for the first time, the idea of the long proboscis, or trunk, which we find higher in the scale, in the shrews and tapirs, and very markedly in the elephant.

THE WIRELESS RECEIVERS OF THE BEETLE KINGDOM

The head is furnished with two large eyes, and sometimes with smaller auxiliary eyes, called *ocelli*. The lenses may be plain, but more frequently the eye is composed of many facets. Sometimes it is divided, for what purpose is not plain in all cases. In the whirling water beetles this division is complete, so that the two eyes of these creatures are, in effect, four.

The antennæ, or feelers, are attached to the head. We might write a chapter on these organs alone. They are of many shapes and designs, though nearly always, in all species, composed of eleven-jointed segments, which give extreme flexibility.

They are organs of touch, but more than that. It is thought that smell and hearing also are in these feelers. But do beetles hear? In the ordinary sense they may not. They may catch air vibrations and little shocks communicated through solid bodies, and feel, as we believe fish do, rather than hear as we do.

The antennæ of wireless receiving stations pick up electric impulses born of sound, as they travel through the ether, and give them to us translated into sound-waves, through the telephones which we place to our ears. Is it not possible that the antennæ of insects are their wireless receivers, and that they have some organ which translates sound impulses to them?

There are beetles which create sound by scraping one part of the body against another. Sometimes it is the legs against the edges of the wing-cases, sometimes it is the rubbing of one part of the body against another which has a specially rough, file-like surface. Surely, it may be thought, with such elaborate preparations as these for making sound, there must be a sense of hearing in the insect.

THE WONDERFUL AND VARIED ANTENNÆ OF THE BEETLES

Wireless picks up everything which can be heard by an ear—and more; it receives electric disturbances from the atmosphere which no ear could perceive. The fiddling and scraping by the beetles may be conveyed to the senses of their fellows by Nature's own wireless.

Whatever the method, scientists recognize the antennæ as the receivers, for beetles have no ears. Some of these wonderful antennæ taper away to a bristle-like extremity; some have thread-like ends, though uniform throughout in thickness; some, again, are composed of rounded joints, like strung beads: feelers with long processes arising from each joint, feelers thickened gradually toward the ends, like those of butterflies, feelers which suddenly swell into thickness, and feelers, as in the case of the cockchafers, which have elaborate fan-like structures.

In that list all the beetles are included, we believe. If all other clues to identity fail, those details, found on an eleven-jointed antenna, will guide us with certainty to the fact that we are in the presence of a beetle.

The term used in zoölogical classification for the true beetles is *Coleoptera*. The name comes from two Greek words for "a sheath" and "wings." It was first used by Aristotle when he observed the firm protective sheaths serving as coverings for the hind wings, which alone are used for flight, without recognizing that they corresponded to the fore wings of other insects. Aristotle's term was adopted by the Swedish naturalist Linnæus and has been universally adopted by zoölogists.

THE BIG FAMILY OF TIGER BEETLES THAT WORK FOR MAN

If it is a beetle, is it friend or foe? There are good and bad in all orders, as we judge them, though not as Nature does. Beetles live by eating, and their meal may be some horrid grub gnawing the roots of growths precious to our

gardens, or it may be something else that we prize highly. For they are found everywhere.

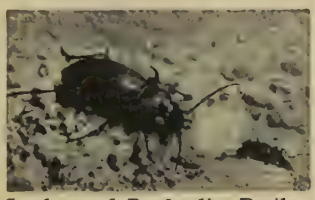
The lovely Tiger Beetles, of which some thousand and more species are known, are clearly on the side of man, in that they live by eating our enemies. Their diet suits them, too, for though they are good fliers, they show immense activity on foot, and turn their nasty food into the loveliest tinted mail whose fine metallic hues the humming-birds could not outshine. They abound on sunny paths and sandy shores of rivers, ponds and the ocean, flying and running swiftly, and are thus very difficult to capture. All the species living in the United States are ground beetles, but in the tropics there are some which live on trees.

At the first peep we meet once more the old mystery of coloration. The beetles are, generally speaking, a secret folk. We do not perceive their millions and billions because they do not thrust themselves on the waking world. Hosts of them show themselves by night; still more hide in the soil, in moss, under the bark of trees, beneath stones.

The present writer while working in his garden has often unearthed beetles of rich copper and lustrous green, deep down in the soil. What purpose can that beauty serve down in the darkness of the earth where the rich coloring cannot be seen?

We have tiger beetles at home which are the farmer's and gardener's friends. Side by side with them are other beetles doing good work for us. How shall we tell whether these other little flesh-eaters are tigers or not? They are ground beetles,

Asparagus Beetle.

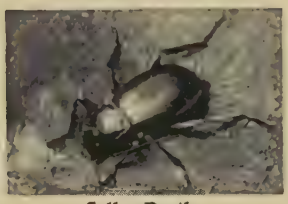


Carabus and Bombardier Beetles.

A Longicorn Beetle.

Harlequin Beetle of Brazil.

The Death Tick.



Cellar Beetle.

Goliath Beetle of Africa.

too, and we cannot be in doubt if we remember that the carnivorous ground beetles are always comparatively dull in color, metallic or black, the tigers never, and that the tigers have a flexible hook to the inner lobe of the maxillæ which is lacking in the others.

But we have greater wonders here, though less ornate. Among this assembly we find the master gunner of the Order, the Bombardier.

The big fellows of the genus belong to the tropics, but under stones where it is neither too wet nor too dry you may find, even in northern lands, a little one as interesting as any in the world. By some means this little beetle has contrived a defense of astonishing efficacy.

When threatened it emits a highly acrid offensive fluid. That, of course, is not unique, for many insects do the same thing. The marvel here, however, is that the fluid issues with what, in the insect world, must be a tremendous report. A dozen times in succession the little gun-squirt is fired, and at each pop out comes a tiny jet of fluid. But it does not remain a jet. It breaks up into a finely divided spray almost like gas.

As the carburetor of a motor car sprays fluid gasoline into a vapor for the cylinder, so this beetle mechanism converts the little jet of acid into a spray of vapor unpleasant to the nose and capable of making the eyes water.

What comic perfection of defense it seems to us, this little marvel going about his tiny world amid the roots of vegetation and under a beetle's dome of stone—a pebble half an inch in diameter—angrily gassing his enemies.

THE QUEER LITTLE CREATURE SHAPED LIKE A FIDDLE

The *Carabidæ* have the Carabus genus as their type, 300 species in number. They are remarkable for the fact that all, save one known species, are confined to the north temperate zone. The solitary exception is found as far away as southern Chile, a problem in distribution which makes many an entomologist pucker his brow.

One of the *Carabidæ* common to East Indian isles is only a museum curiosity with us. It is worth seeing, for by some queer change it has taken on the shape of a fiddle, and has the popular name of Violin Beetle. Many of the group are skilled burrowers, in woods, in the banks of streams, and even down to the margin of the sea. They reveal themselves but little; they lie lurking in their secret places seeking whom they may devour.

For that both sides must settle accounts with Nature. We can only be grateful for this unchecked war. The carnivorous ground beetles do work that we ourselves cannot. So many injurious grubs harbor in the soil, out of sight, where we are unable to reach them. Who can grapple with the caterpillars which devour his rose-leaves by night and hide in the earth by day? We cannot do it. The ground beetles must, or our roses will perish, and with them our patience. Heavy is the debt we owe these little winged people who tread the hidden depths of the soil as natural subways.

THE LITTLE DIVER WITH A SPLENDID HEM OF GOLD

The *Carabidæ* brought us to the water's edge. Let us pause by a pool and see their fresh-water cousins, the carnivorous water beetles, at their daily occupation. There are several species of *Dytiscus*, the Latin name given to these fine cruel creatures because it means "fond of diving."

We all know these beetles, though not their story. See one pop up from below to the surface, stick the nether extremity of its body out of the water to collect a bead of air, then turn and dive again, and we know at once it is dependent on the atmosphere for respiration, as we are. How, then, does it breathe in the water beneath which it stays so long at a time?

The air it collects is snared beneath the elytra, and is gradually absorbed in the body by the spiracles which run along both sides of the body and thorax. Its larvæ are air-breathers also; there is no gill-breathing stage for them as there is for the tadpoles of amphibia. They also rise to the surface to take in air. But, as all beetles undergo the complete transformation from egg to larva, from larva to pupa, from pupa to imago, which we have already pondered, we are brought face to face with that which seems impossible: an air-breathing chrysalis which lies, during its trance and conversion from one form into another, in the water.

ANOTHER BEETLE'S WAY TO MAKE HER EGGS SECURE

But here is one of the strangest things in the beetle world. The egg is laid in a hole bored by the tubular drill of the mother in the stem of a reed or other

water plant. It hatches there and the larva enters the water. But when it is about to become a chrysalis instinct impels the larva for the first time to seek the land, make itself a little burrow, and there lie quietly to suffer its change, always in contact with air. It leaves its burrow a perfect beetle, and flies to pond or ditch, to resume the work of fierce destruction of life which it began, continued and ended for a while as a grub.

Back now to the land, to find ourselves, it may be, challenged by that ferocious-looking little gentleman in black, the Devil's Coach-horse. He is much better in performance than appearance, for, roaming far and near, he is ever after grubs, slugs, snails and other things which eat our garden plants.

THE TERRIBLE POWER IN THE JAWS OF THE FIERCE ROVE BEETLE

What a fund of courage there is among the beetles! This one, if you threaten him with a finger or a pencil, will open his jaws and curl up his body with the apparent ferocity of a green lizard. But he really means it; he will seize the pencil with his sturdy jaws and hold with such grim wrath that you may swing him round and round without shaking him off. One has seen a Rove Beetle bite a caterpillar in half at a single effort and march off with one-half of his kill in his formidable jaws. They are easily recognizable by their long linear black bodies with remarkably short elytra and seven or eight visible horny abdominal segments. Though sometimes an inch in length, they are more commonly minute, inhabiting wet places under stones, fungi, moss on the bark of trees.

Our rove beetles have a nasty odor. Possibly some of the genus distil a sweeter perfume, or are ant and termite tastes less fastidious than our own? Whatever the case, certain rove beetles are welcome guests in the cities of ants, where, like the feebler plant-lice of our own clime, they act like milch cows and give out a milky fluid to the ants and termites in exchange for board and lodging. A curious point of the arrangement is that the roves which house with termites do not lay eggs, but produce their young alive.

Of course, the rove is not the only beetle occupant of the ant's nest, for every boy who has peered into the nest of our common yellow ant knows that there is a beetle there which is not a rove. It is one of the *Clavigers,* whose antennæ have but six segments, instead of eleven, and whose head has no eyes.

WHY THE ANTS WELCOME BLIND VISITORS TO THEIR HOMES

The *Clavigers* are parasites, and could not live without the ants. Yet they return payment for what they get. They must dwell underground forever with the ants, they must be fed by the ants, like the ant queen and babies. As a set-off for this service they secrete a juice dear to the palate of the ants.

The beetle is sightless and wingless. It can neither see nor fly, yet it flourishes. There are nearly a score of species of it, and all, so far as is known, make ant homes their refuges, and all claim food and washing, as of right, in return for the substance which, useless to themselves, they give off for the sole delight of their hosts, servants and masters, as indeed the ants are to them.

Next a larger group, the Carrion Beetles, which include those whose habit of burying their feasts has earned for them the title of Sexton, or burying, beetles.

Whatever may be the doubt as to the hearing of beetles, there is no question as to the marvelous keenness of the sexton's power of smell. A mole, a vole, a mouse, a bird may die with no burying beetle in sight; yet, with extraordinary speed, up come the winged undertakers from everywhere to perform their useful task.

They remove the soil grain by grain from beneath the little corpse, and gradually sink it in a hole, then cover it over. The funeral is decently performed, the rites complete as far as we may see. But down there in the darkness life is to be born of death. The mother sexton lays her eggs in the dead body.

NATURE'S LITTLE SCAVENGERS AND THE GOOD WORK THEY DO

The eggs hatch there; the larvæ eat the flesh in which they were cradled, and sad corruption is transformed into enrichment for the soil that has given it its last resting-place. We may not care for the operations of hyenas, jackals, vultures and sexton beetles, but they are essential to the sweetness of existence. Millions of other forms of beetles are doing for rotting trees and shrubs and fungi what these little sad-looking burying-beetles are doing for us in removing the evidence of animal disasters.

Unhappily, some of the species are destructive of wheat, the leaves of sugar-beet, mangel-wurzels and other crops of importance to man and animals.

The *Histeridæ*, 1,200 species strong, are interesting, though unlovely. While their staple food is manure, they attack and devour the great and powerful dung beetle. When disturbed the insects retract the antennæ and feet, appearing as if dead. Their nearest allies, the *Nitidulidæ*, live on decaying vegetable and animal matter, and even bones. Some are found about the punctures through which sap escapes from the trunks and branches of trees.

The *Dermestidæ* is a widely ranging group of beetles which in the adult stage are harmless, but in the larval condition work havoc in bacon and cheese, in the stuffing of upholstery, and in the treasure cabinets of our public museums and private collections. Every entomologist dreads the presence of them in his cabinet. The ugly bristly larva hides very skillfully in the body whose interior it consumes, leaving only the shell ready to fall to pieces at the slightest jar.

A DESTRUCTIVE RAIDER OF PRECIOUS COLLECTIONS IN MUSEUMS

There are some which like dried skin, feathers and fur; there are those whose appetite is freshest for rare insects. It is a matter of the greatest difficulty to keep them out of such collections, and the rarest specimen of bird or insect might be destroyed by their eager and undiscriminating jaws. The only exhibit of its kind in the world would fall before their wicked little mandibles as readily as the commonest specimen.

A word next on the Stag Beetles, the finest things we have in the Order in the North. The larvæ live in the wood of old oak and other trees of ancient record. So great is the amount of structural work to be done in getting them from the grub to the perfect condition, with mailed coat and jaws resembling the antlers of stags, that three or four years elapse before their growth is complete.

These lead us to a mighty host called the *Lamellicornia*, the group in which are the Scarabs, the sacred beetles of the Egyptians. There are scores of species of scarabs, common to Southern Europe, where Henri Fabre studied them and wrote one of the most fascinating of his essays on the life-habits of these consumers of animal refuse. They include the mammoths among insects, and in the tropics are most numerous, most quaint and most gigantic. They are easily recognizable by their clubbed antennæ, which when laid against the head so overhang the mouth parts as to give rise to the term "beetling." One species, common southward, is called the "Tumblebug," as it incloses its eggs in pellets of manure, holds them between its hind legs and rolls them away to a place of safety. Its body is bright copper color, and the male has a large horn on its head.

BIRDS PROTECT OUR CROPS FROM THE COCKCHAFERS

Nearer at hand we have lamellicorn examples in the well-known June bug, or Dor bug, which comes with the first warm nights of early summer. A great thud repeated again and again against the screen is its signal to be admitted to the circle of light within our house. Girls are nervous lest June bugs get into their hair, and boys are quite often mischievous in their capture of the great blundering chestnut-brown beetles. They are nearly an inch in length, with yellowish hairs beneath. The larva lies on the roots of grass and is often turned up by the spade or plow. It is injurious to growing corn and wheat. Then comes the pupa in its rude earthen cocoon in May, and the developed beetle in June feeding voraciously on the leaves of fruit trees.

It is with an aching heart that one has to confess that the Click Beetle is an enemy of man. The beetle itself is one of Nature's funny men. You pick it up and it clicks like a clockwork toy; you put it down and it leaps into the air with the amusing alacrity of a still better toy. But in its larval stage it is the dreaded wireworm which by its numbers is ruinous to crops.

THE TERRIBLE DESTRUCTION WROUGHT BY THE LARVÆ OF A BEETLE

Have you ever seen land where root crops have come only in small patches, leaving great spaces of soil bare? It is the work of wireworms below. When a field has become infested, the farmer puts on his heavy roller before sowing, and tries to make the subsurface so hard that the pests cannot get up to gnaw his surface-rooting stuff, but you know as you witness the operation that that is only a temporary remedy. The soil should be opened up so that birds, one of

the natural police forces in such matters, may get at the larvæ and, devouring them by thousands, convert them into the song, flight and eggs of more birds. The wire-worms get their name from the shape of the bodies of the larvæ, which are long and cylindrical.

Next come the delightful fireflies and glow-worms, rightly placed here, for they are not worms but beetles. Everything that crawled was a worm to our ancestors, down to Shakespeare's day and beyond; even the snake with which Cleopatra killed herself was called a worm, and so the crawling founts of light, the *Lampyris noctiluca* of Europe, were called Glow-worms.

It is probably the wingless condition of the female glow-worm which causes the blunder, but the male is a bold winged flier, and it is to call him to her side that the sombre little lady among the grass, supping on snails and slugs, lights her gorgeous lamps—little gleams of greenish radiance bursting at her will from organs arranged along the edges of the last two segments of her body. The male has, in a lesser degree, this gift of radiance, and he lights up too, as some think, with a view to frightening off enemies, but the signal is probably more frequently used as a call to his mate than as a threat to a foe.

Living streams of flame in the forests by night

It is in the American tropics that such natural schemes of illumination are most brilliant. There the Fireflies, exotic members of the group to which our click beetles belong, have attained such a marvelous power of radiance that as they fly through the forest at night the air seems to catch fire and to burn in streams of flame behind them. The effect is purely a trick of the eye, of course, for the light is part and parcel of the beetle's anatomy and not an external thing at all.

For long the light was supposed to be phosphorescent, but two Indian students took up the study, and by a series of fascinating experiments proved that the light of the firefly is akin to X-rays and ultra-violet light.

When placed in the dark they lighted their lamps with such effect that the light went through opaque objects—leather, wood, black paper, flesh—and recorded itself on photographic plates. Here is an unexpected marvel for you, the opening of a little door into an undreamed world of scientific magic.

How a bottle of fireflies helped a famous doctor

After that the old stories of how natives in Cuba and elsewhere light their huts and cottages by night by means of a few fireflies caged in a prison of glass, and of how native beauties wear them like live diamonds in their hair, cease to astonish us; but it is worth adding that during the Spanish-American War in Cuba, Colonel Gorgas, later so famous in connection with the Panama Canal, carried out an operation by the light from a bottle of fireflies.

So much for light. Let us turn to the dark, and the boring beetles which delight in it. Chief of them for our purpose is the so-called Death Tick beetle, or, as science knows it, the *Xestobium tessellatum*. The furniture people call it the woodworm, because its soft-bodied larvæ, when found in the wood, look like little worms. But to the writer, when a little boy, it was made the symbol of terror as it has been to millions of others.

It is a beetle which lives in dry wood and feeds on the substance of its home. It has a hard little head which we cannot imagine ever to ache, seeing that it bangs it on the floor of its dwelling as a signal to its mate in some other tunnel in the furniture. And the answer is made by similar means. The taps are the beetles' code of signaling.

The sounds are heard only when rival noises are hushed. Naturally they are most perceptible in the still watches of the night. It is when we sit with sorrow brooding in our hearts by the bed of some poor sufferer that we are most apt to notice them. So in course of time a sound heard only in the stillness of a sick-room came to be reported as an omen of death.

The silly superstition that gave the woodworm its name

It is a miserable superstition which has poisoned many a mind, old and young, with unnecessary fear. The so-called death tick is always ticking, day and night, wherever it has its habitation.

There is a danger in the beetle far more real than this ignoble legend. It is destroying some of the noblest woodwork in the world. It ate nearly all the grand roof of Westminster Hall, as we have noted; it has been found in other great

old buildings in London; it is in the timbers of cathedrals, churches and mansions famed in literature and history.

To get rid of it proved an almost superhuman task. For years and at a cost of over four hundred thousand dollars, men worked at Westminster, taking out huge beams where the beetles had made holes big enough to receive the entire body of a man. The worst parts of the timber were taken away bodily and replaced by steel; then the remainder was treated to as severe a gassing as was employed in actual warfare during the World War.

THE INTELLIGENT BABY THAT BRINGS ITS OWN CRADLE TO EARTH

It is a blessing that the Longicorn Beetles do not breed as fast as some others we have considered. Their larvæ are so deliberate in growing up that a seventeen-year cicada is a mere youth in comparison with the veteran babies of the Order. They are white, helpless-looking things in the larval stage, but Nature has made the babies as full of wisdom as their mothers.

Some longicorn mothers, the Girdlers, having laid an egg in a small branch of a tree, cut a ring right around it, so that the wood withers, and eventually down comes baby, cradle and all, with the happiest results. But in another species the infant carves out its own fortune. Having reached the desired degree of growth, and feeling a disposition to become something better than a grub, it enters a large limb of the tree, bites it all around, and thus secures its descent to the ground. And in that wooden sanctuary the baby becomes a chrysalis and comes forth a winged longicorn beetle.

When food, warmth and moisture from sap are favorably furnished, some longicorn grubs complete their change in a year, but under bad conditions their infancy may be enormously prolonged. Mr. Gilbert Smith, an architect by profession, but a rare insect student by choice, has found that the pupal stage of the *Prionus brevicornis,* which lives in balm of Gilead and Lombardy poplar, regularly requires twenty years to pass from the grub stage to the imago.

THE SURPRISE WHICH MAY AWAIT US IN OUR DINING-ROOM TABLE

We need more information as to the stages of life of other longicorn larvæ. For example, *Monohammus confusus* has been known to issue from the wood of furniture manufactured fifteen years before—how long had it been there before the tree was felled?

Other longicorn larvæ have buzzed out of tables twenty-eight years old, and one traveled about the world for years, quietly devouring the wood of the "tree" on which a careful and observant owner stretched his boots.

But the record, so far as is known, was attained in 1924 by a larva which had traveled all over the world in the wood of a pencil-box. She was for twenty-five years the property of a doctor, and wherever he went the larva in her pencil-box was sure to go. Her owner never had any trouble with her except for the fact that she was rather unmannerly, in the sense that she was noisy in eating, and at nights, when banqueting on her timber, would wake him up with the clatter of her jaws. After twenty-five years the doctor wearied of his responsibility and handed the larva in its box to the Natural History Museum at South Kensington, England.

THE PART THE BEETLES PLAY IN THE RISE AND FALL OF HUMAN FORTUNES

The museum officials received her with the grave attention due to a baby of such age, and added a fresh piece of wood to her cradle-larder. For another six years she mused and gnawed and nodded. Then she died, certainly thirty-one years old and possibly much older, the oldest baby ever known on earth. The tragedy was that, as she never grew up, we shall never know to which of the 30,000 species of longicorn beetles she belonged.

There remain multitudes of other beetles for the student of the subject: Oil Beetles, whose larvæ lie in wait for bees, seize them by the hair, and ride home to dwell in the hive and batten on bee grubs; all the monstrous company of Weevils, which infest our nuts, clovers, foliage, apple blossoms, cabbages, grain and tree-trunks; the beetles which devour our peas and beans; the Ladybirds which police our roses and other growths imperiled by the greedy plant-lice.

We do not know half the species of beetles which are found in the world. But we do know, as is clear from these notes about them, what an immensely significant part these swarms of big and little creatures play in the rise and fall of human fortunes. Some colored pictures of beetles are on page 6548.

THE NEXT STORY OF ANIMAL LIFE IS ON PAGE 6721.

TWO MEN WHO TAUGHT THE INDIANS

HERE and there you have read about the devoted band of Jesuit priests who went about among the Indians, and braved death by torture at their hands, that they might teach them to become Christians and give up their cruel ways. One of the most distinguished of these men was Père Jacques Marquette, who is known simply as Père, or Father, Marquette, a gentle, kindly man who won the love of the Indians whom he taught. Twenty years before Père Marquette began his mission to the Indians in the West, John Eliot, a Puritan clergyman, had begun to teach the Indians of Massachusetts. He preached to them and taught them for fifty years, and reduced their language to writing and translated the Bible for them. This story tells us of the lives and work of these two great men.

TWO MEN WHO LOVED THE INDIANS

CONTINUED FROM 6515

AWAY in France in an old château in the city of Laon, which stands on the banks of the river Oise, a little boy named Jacques Marquette was born nearly three hundred years ago. Jacques was a round-cheeked, joyous-hearted little fellow with generous, impulsive ways which won the hearts of all about him. The servants adored him, and Jacques' mother thought there was no other boy like him in all the wide world. Madame Marquette was a devout Catholic, and she would often entertain Jacques for hours by telling him tales of the brave Jesuit Fathers who went out into far-away lands to carry the gospel of Jesus Christ to the heathen. Little Jacques, sitting on a hassock at his mother's feet and propping his curly head against her knee, would listen with shining eyes and parted lips to the stories of daring and self-sacrifice.

The years passed and the rosy-cheeked little boy grew into a tall young man with earnest eyes. His mother's cherished dream came true. Jacques became a Jesuit priest, and in 1666 was ordered to go to Canada. One day he said good-bye to all his friends and set sail across the Atlantic for the great, new land of America. Traveling in those days was very slow and it was many months before the young priest reached the little mission on Lake Superior in the heart of the wilderness, to which he had been appointed. Once there, however, Father Marquette set to work with vigor and enthusiasm. He began to learn the languages of the various Indian tribes, and then in an earnest, simple way told them how Christ had come down to earth to die so that all men might be saved.

The Indians listened perplexedly. At first they did not understand this white man with the long black robe who went about with a strange look in his eyes and who talked about a Manitou who was all love. He did not seem like the white men they had met before. He did not seem to want anything for himself, and he would travel many miles in the middle of the night to help a sick child with his simple remedies. Gradually the Indians began to trust, and then to love him. They listened, too, to what he had to teach, for surely one who had no ends of his own to gain must speak the truth.

By and by the fame of the "Young White Father" spread abroad, and Indians from the more southern tribes began to come to hear him. One day there arrived at Father Marquette's little mission a delegation of Indians from the tribe of the Illinois, who lived far away on the "Great River." The strangers listened to Father Marquette

as he preached, and then they presented themselves before him.

"Let the Young White Father come to the people of the Illinois," they said. "I cannot leave my mission now, but I will surely come," promised Father Marquette, his heart aglow within him at the thought of this wonderful opportunity.

From this time on Father Marquette made it his special prayer that the way might be opened to him to go to the Indians of the Illinois. One day there arrived in the camp a small band of men under the leadership of a young man named Louis Joliet, who had been sent by Count Frontenac to explore the "Great River." Father Marquette was instructed to go with him on the journey. It seemed so like a direct answer to his prayer that the good priest was filled with thanksgiving and eagerly prepared to join the expedition.

The journey began one bright spring morning late in May in the year 1673. The adventurers launched their canoes and paddled gaily over the sparkling waters of Lake Michigan to Green Bay, where they found an encampment of the Wild Oats Indians, who crowded around the white men. Father Marquette was able to talk to them in their own language, and he told them that his party was bound for the "Great River." The Indians listened to his words in polite silence, but when he paused they tried earnestly to persuade the voyagers not to go forward.

"What are they saying?" asked Joliet, curiously.

"They say," said Father Marquette, "that we will surely be killed. They say that there are wild Indians and great water monsters and a horrible river demon." He turned to the Indians and spoke with a ring of triumph in his voice. "People of the Wild Oats," he said, "the white men are not afraid of river monsters or demons, for they have with them always the spirit of the great Manitou, who will let no harm happen to them."

Then the white men bade good-bye to the wondering Indians and set out to paddle up the Fox River. The upper course of the stream was so shallow that the adventurers were obliged to carry their canoes and walk along the bed of the river. The way was rough, and often the sharp stones cut through the men's moccasins, but the party was in high spirits. As they marched sturdily along, now and again one of them would break into a rollicking French song, and the others would take up the refrain in a resounding chorus. Joliet and his followers were filled with excitement at the prospect of adventure, and Father Marquette was radiantly happy in the thought that he was going into a strange land, perhaps to death, on his Master's business.

When they came to the head of the Fox River, they made a portage, that is, carried their canoes across the country to the Wisconsin River, and soon were floating on its pleasant waters. After a week on this river they reached the Mississippi, on June 17, 1673. The enthusiastic young missionary wrote that he saw the great river "with a joy that I cannot express."

Day after day they floated down the "Great River." They encountered strange scenery, strange animals, strange birds and strange tribes of Indians of the interior. Wherever they came upon an Indian encampment Father Marquette preached the gospel of Jesus Christ. "I know not whether they understood what I told them of God and the things which concerned their salvation. But it is a seed cast in the earth, which must bear its fruit in season," he wrote in his diary with his engaging hopefulness.

A thing that is strange to record, compared with every other narrative of the time, is that there was no quarrel between captain and priest. Father Marquette and Captain Joliet got along famously. The captain respected the shrewdness and good judgment of the young priest and often sought his advice. Joliet himself had studied to be a priest, but the wild, free life of the woods drew him away from his books to make him a famous explorer.

Although intent upon making converts of the Indians, Father Marquette was also keenly interested in the exploration end of the expedition. He tasted the mineral waters of Wisconsin; he tested on his paddle the colored clay used by the Shawnee Indians for coloring their skins; and he cheerfully wielded his canoe paddle with the best of the men. The two men were well matched.

As they got farther and farther down the Mississippi the heat became intense and the mosquitoes were so thick that they were almost unbearable. The explorers found that the Indians on the lower river slept on high scaffoldings,

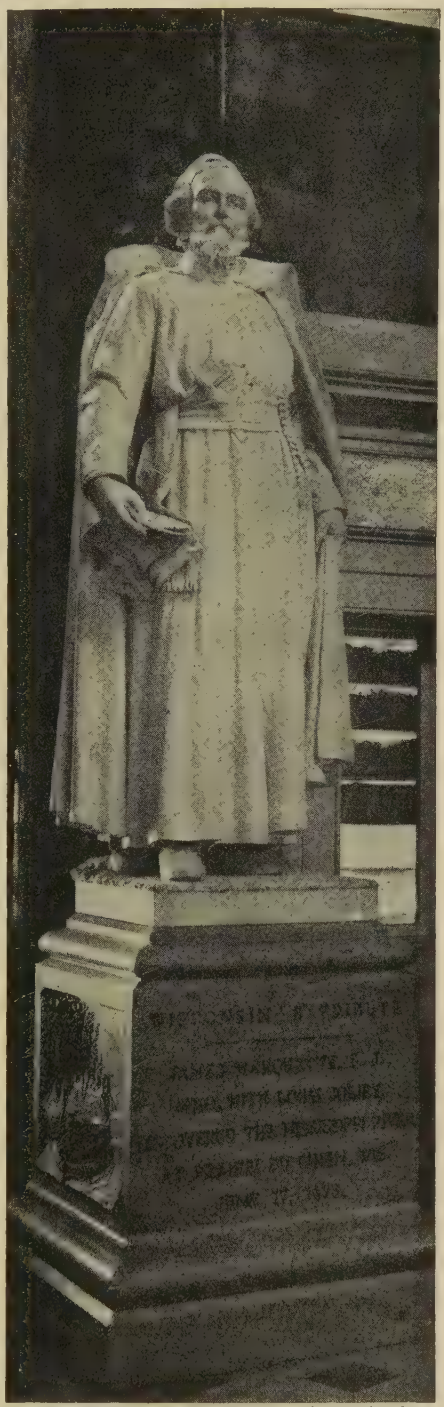
under which they built a smudge fire, and they, too, were obliged to resort to this method to escape the swarms of stinging insects. At last a few days more would have brought them to the mouth of the Mississippi, but Joliet had heard that the Spaniards were in possession of the land around the Gulf of Mexico, and after a consultation with his men he decided to turn back. The Spaniards did not like anyone to trespass upon the territory they claimed.

On their return they turned into the Illinois River and paddled up to its source. Then they carried their canoes across to Lake Michigan. It is thought that they reached the lake near the present city of Chicago. Then they paddled up Lake Michigan and reached Green Bay late in September. In four months they had traveled more than twenty-five hundred miles in their canoes.

On the way back they passed through the village of the Kaskaskia Indians, who begged Father Marquette to remain with them and establish a mission. But the young priest's health had been seriously affected by the tropical heat of the midsummer sun and the unwholesome, moist climate of the lower Mississippi, and he was now very ill. He was very loath to leave the Kaskaskia without telling them of his "glad tidings," but his companions refused to leave him behind in the wilderness, and Father Marquette, who was too weak to protest, promised to return to the interior as soon as he was well.

When he was again able to travel he set out with a little band of his convert Indians to keep his promise to the people of the Kaskaskia, but he got no farther than the present site of Chicago when he was again attacked by his terrible disease. He was therefore obliged to stop on his journey and spend the winter among the Indians of this region. As in every place where he had gone, he soon won the devotion of the Indians. From all around they came to listen to the inspired words of the Young White Priest. The Indians believed in Father Marquette and loved him as they believed in and loved no other white man. And why? Because he believed in them and loved them as no other white man had ever done. He saw no guile nor treachery in the Indians. Where others saw only bloody, repulsive savages, he saw men—red, in truth, but with unselfish, hospitable, generous natures and a deep religious sentiment.

In the spring of 1675 Father Marquette was again stronger, and he went on to the Kas-



In the Capitol at Washington there stands a statue, erected by the State of Wisconsin, in honor of the brave missionary priest, Father Jacques Marquette, who was one of the first white men to explore the Mississippi River. The story of his life is a beautiful one, and it is no wonder the Indians loved him.

kaskia to establish the mission, as he had promised. Here illness again overtook him, and he set out for Canada, accompanied by a handful of his Indian friends, to die among his own people. Day by day, as they hurried northward, the young missionary grew weaker, until at last, when they reached Lake Michigan, he knew that the end was near. He had met all his pains cheerfully and uncomplainingly, and now he faced death with a sort of exultant joy—joy that he should be allowed to die in his Master's cause. Quite simply he told his Indians that he was glad to go, and spoke of the joy that awaited him. Then he asked to be carried to a little hillock that overlooked the sparkling waters of the lake.

"I thank you for your patience with me in my sickness," he said. "I am sorry to have given you so much trouble."

Then he told them to go to sleep and get a little rest. He would call them when he felt that death was coming. For a while he remained in silent prayer. Presently he called, and there in the wilderness, surrounded by a handful of devoted Indian converts, Father Marquette died, at the age of thirty-eight. His bones were not allowed to remain in the wilderness, but were later carried by some of his Indian converts to the chapel of the Mission of St. Ignace, which had been founded farther up the lake. So ended the life of a heroic figure in the early history of North America.

JOHN ELIOT, THE APOSTLE TO THE INDIANS

WHEN Père Marquette was a curly-haired boy listening to his mother's stories John Eliot, the great Puritan teacher, had already begun the work among the Indians of Massachusetts which won for him the name of the "Apostle to the Indians." He aimed at nothing less than providing Indian teachers as missionaries to spread the Gospel among their own people, and at that very time he was engaged in perfecting his knowledge of their language that he might be able to teach them to read.

John Eliot was born in England, in 1604, probably at a little town called Widford, in Hertfordshire, where he was baptized. We know little about his boyhood except that he had a happy home and was well taught, so that at the age of fifteen he was able to enter Jesus College, Cambridge, where he graduated at the age of nineteen. His father, Bennett, or Benedict Eliot, was a yeoman, that is, a man who owned land but had not a large estate.

After he left the university young Eliot became assistant in a school, where he taught for about seven years, and a delightful teacher the boys under his care must have found him. Some time during these years it is believed that he was ordained, and possibly he preached to the people among whom he lived. Certainly he gained their friendship and confidence, and before he sailed away to the New World a number of them told him that they would follow him, and gained his promise that he would be their teacher.

By this time Thomas Hooker, the principal of the school in which he taught, and probably John Eliot himself, had fallen under the displeasure of Laud, the Archbishop of Canterbury. The school had been broken up, Thomas Hooker had already left the country, and in 1631 John Eliot sailed for Boston to begin life there. The good ship Lion, in which he sailed, made a prosperous voyage. Ten weeks after he embarked he landed in Boston, where the people held a day of thanksgiving for the safe arrival of the ship, which also brought Governor Winthrop's wife and children. Throughout the winter John Eliot ministered to the church in Boston, for Mr. Wilson, the pastor, had gone to England to bring his family to their new home. The young teacher won the love of the stern Puritans of Boston; but they could not keep him, for early the next year his friends arrived, as they had promised, and made a settlement at Roxbury, and in accordance with his promise he went to them.

The following year Hannah Mumford, or Mulford, to whom he had been betrothed in England, joined him. There was a simple wedding in Boston, and they began their long and happy life together in Roxbury. For nearly sixty years thereafter he taught and preached in Roxbury, and took a prominent part in the church affairs of the little colony. He was one of the three men who arranged the Bay Psalm Book, of which you may read on page 6509. He was prominent, too, in educational matters, and was one

of those who signed an agreement to build a free school in Roxbury and support a schoolmaster.

While he went about his duties the state of the Indians weighed heavy on his mind. He was a man of loving spirit, and their savage life and pagan beliefs grieved him sorely. At length he took into his house a young Indian, from whom he set to work to learn the language of the Algonquins so that he might teach them, and in 1646 he preached his first sermon in the Indian tongue in the wigwam of Kitchomakin, in a grove at the mouth of the Neponset River.

But this good man was not content to teach the Indians by preaching to them. He wanted them to believe intelligently the things that he taught them, and he strove to raise them up from the wretched way in which they lived. Not content with learning to speak their language, he set himself to the task of making it a written language and of making a grammar for it, and when that was done he translated the Bible into it. This took time of course. First he translated a little catechism, then the Book of Genesis, after that St. Matthew's Gospel, and so he went through the whole Bible bit by bit. This translation of the Bible into the Indian tongue was the first Bible printed in America. He translated some other books for them. A copy of one of them sold in 1925 for $34,000, probably more money than the minister spent in his whole life.

Meantime he continued to teach the Indians; and to help them to live in a better way he founded a town for them at Natick, where they learned to cultivate the land set apart for them. He taught them that cleanliness is next to godliness. His converts learned to read, and before admitting them to the church he demanded that they should follow the stern rule of life laid down by the Puritans.

JOHN ELIOT PREACHING TO THE INDIANS

Every other Sunday, year in and year out, he went on horseback from Roxbury to Natick, which is some miles away, and it is said that his horse's feet made a beaten path through the woods. Stern though he might seem, he was sweet and loving and gracious, and of a humble spirit. Always his horse was laden with comforts for the Indians, and his pockets were filled with cakes and apples and goodies for the children, whom he loved.

"The care of the lambs," he wrote, "is one third part of the charge over the worke of God." When years told on his frame and his friends tried to induce him

to give up his labors for the Indians he refused, saying, "I will never give over as long as I have legs to go." He firmly believed that the Indians were the remnants of the Ten Lost Tribes, of whom you may read in the Story of the Scattered Nation. He hoped to bring them back to the state from which he believed they had fallen, and so he labored for them year after year. At first he preached under a great oak tree, which still stands at Natick; but after a time a church was built, in which there was an upper chamber, where the apostle might spend a restful night after a day of preaching and teaching.

Not content with teaching at Natick, he went on missionary journeys, and it is said that he traveled through the woods from Cape Cod to Concord. At first he not only had to face the danger of capture and torture by hostile Indians, and to work against the opposition of the Indian chiefs, but he was also opposed by the settlers, who believed that no good could be gained by teaching Indians. Nevertheless, he persevered. As the years went on, many converts were made, and there were no less than seventeen villages of what were called "praying Indians."

But in 1675 an Indian chief known as King Philip made war against the English settlers. He and his followers and allies committed such cruelties that the settlers were roused to a state of fury against all Indians, and though few of John Eliot's converts joined Philip, they were all removed from their villages to Deer Island and to Long Island in Boston harbor. After a time, at John Eliot's earnest request, they were allowed to help the settlers to overthrow Philip, and later they were permitted to return to Natick and three other villages, but the Christian settlements were never so strong again. After the war was over, John Eliot protested against the sale of captive Indians as slaves. His charity was never failing, and it is known that at his own cost he brought back one man who had been sent to Jamaica, and also redeemed the wife and children of this man.

In 1687 the greatest grief of his long life came to him when his wife died. All his life she had been his greatest helper. It was she who looked after the household, and saved him from all worry about his money affairs, so that he might devote himself to his teaching and translations. "I shall go to her," he said, "but she shall not return to me," but he lived on three years longer and died at the age of eighty-six. One of his successors said: "His missionary spirit and earnestness were as wise as St. Paul's, his charity and sympathy as sweet as St. Francis of Assisi's, and as years go on he becomes one of the most commanding figures among all the English Puritans who entered into the early life of America."

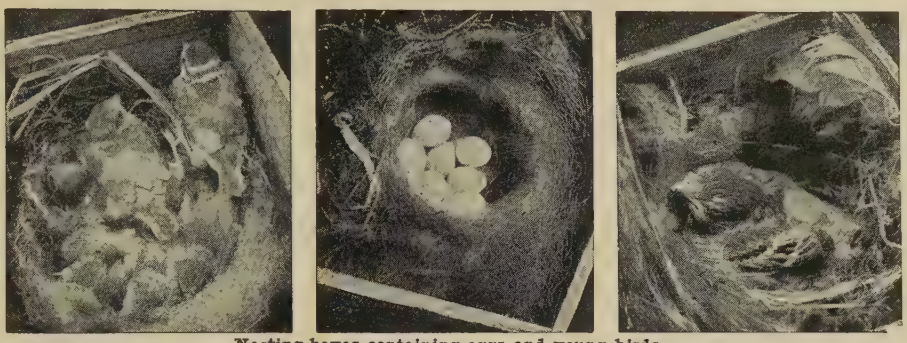
An Indian missionary who had been ordained some years before John Eliot's death tried to go on with the work among the Indians, but he had not the authority that a white man would have had among them, and he was not successful. John Eliot was almost alone among the settlers in his belief in the Indians. His son John, whom he had trained to take his place, died over twenty years before him, and no one had enough interest in the mission to carry it on. Gradually the Indians fell away, and in 1716 their church was closed. Another church has been built on the site where it stood, and close by a monument has been erected to this self-sacrificing missionary, who was one of the very few to claim justice for the Indians and who sought to teach them how to take their place in the civilization of the white men among whom they had to live.

He saw very clearly that as long as they kept to their old ways of living it would be very hard for them to hold to the truths of Christianity, which he taught them. He believed that if they were to be really Christians they must learn the ways of Christian civilization.

His efforts as a pioneer in education are overshadowed by his fame as a missionary, but the people of Roxbury do not forget that he never ceased to declare the need for education in the colony, and that the year before his death he gave seventy acres of land at Jamaica Plain to support a school.

It is interesting to note that long after John Eliot had died those in charge of Indian affairs finally came to very much the same conclusions that the devoted missionary had reached many years before. Many difficulties and much bloodshed in the relations of white and Indian might have been avoided if the white men had only been wiser. Teaching people is a much better way than to attempt to force them to obey blindly rules and regulations they cannot understand.

THE NEXT STORY OF MEN AND WOMEN IS ON PAGE 6913.



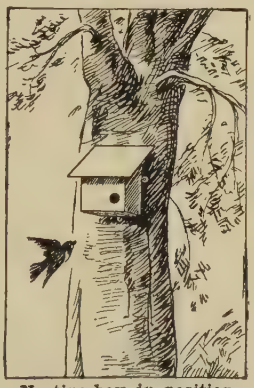
Nesting-boxes containing eggs and young birds.

NESTING-BOXES FOR BIRDS

CONTINUED FROM 6524

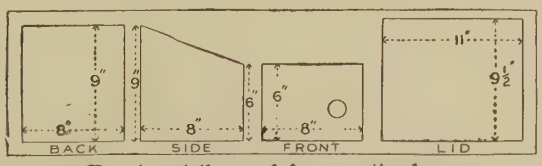
TO the boy or girl who is a lover of nature there are few more enjoyable hobbies than that of putting up nesting-boxes for the birds. On page 341 a number of suggestions were given for constructing bird-houses for different kinds of birds. This article gives more definite directions for making nesting-boxes for the back yard. There are few yards where we cannot entice the birds to nest in a little box placed on a tree or a wall for their convenience, and the cost of erecting nesting-boxes is practically nothing.

First of all, as to the boxes. These may be of the simplest and roughest kind, provided they are weather-proof. A small box from the grocer's may be cut down, but if we wish to make a nesting-box, the best form is as follows: Take a piece of wood 8 inches by 9 inches, as shown in the lower picture. This is for the back of the box. Then cut two pieces for the sides 9 inches high on one side, 6 inches on the other and 8 inches wide; a piece 8 inches by 6 inches for the front; and a piece for the bottom. The exact size of this bottom piece will depend upon the thickness of the wood used. Thus, if we use wood ¼ inch thick—which is a very good thickness—the bottom must be 8 inches by 8½ inches. With thin nails fasten the two sides to the back, and then nail the front into position. Now fix on the bottom. We next want a piece of wood 11 inches by 9½ inches for the lid. This is hinged on at the back of the box in such a way that it is flush at the back, but reaches out beyond the box all round on the other sides. The edge of the lid at the back must be beveled off to allow of its being opened. Before putting in the front we should make a round hole, varying in size according to the birds we wish to nest in the box. For the exact size of the hole see page 341, which specifies the diameter found most suitable for each kind of bird.



Nesting-box in position.

We must now decide where to put the box. If possible, the box should face north or east, and it should be fastened firmly by a nail, screw or hook to a tree or wall, out of reach of cats and other creatures that prey on birds and their eggs. A good height at which to fix the box is from 8 feet to 12 feet, and if it is on a tree it is well to fasten round the tree a broad band of zinc, which will prevent cats and other enemies from climbing up. The sloping roof will allow the rain to run off, and will prevent cats lodging on the top and catching the birds as they go in or out. In one garden, different nesting-boxes were occupied by redstarts, great tits, orioles, nuthatches, tree sparrows, house sparrows, starlings and wrens. The birds, as soon as they have selected our box for a nesting-site, begin to build their nest. Then the female lays her eggs, and while she is sitting we may once or twice a day open the lid at the top and have a peep; but we must not disturb the bird too much. Later, the birds are hatched, and we can watch them until they fly away. Remember that birds usually come yearly to the same spot to nest.



How to cut the wood for a nesting-box.

MAKING A BASKET OF RAFFIA WORK

RAFFIA is another name for bass, which we use in the garden for tying up plants. It hangs in a familiar yellow bunch in the greenhouse, and we all know it quite well. Here we are going to learn how to make a basket-bag with it.

There are two kinds of this material, one a little coarser in texture than the other. This is really the bass, and it comes from the bark of the lime tree; while the raffia, which is finer, is made from a palm grown in Madagascar. Specially prepared raffia may be had at all good fancywork shops in large or small hanks. As it can never be got in very long pieces, frequent joinings are necessary, and the simplest way to join it is to make an ordinary knot and cut the ends off neatly—but not too closely, or it will come undone again—for we are going to use raffia like wool, and work it into a basket with a crochet-hook, afterward braiding a handle, and finally decorating it with small tassels. When we get our bundle of raffia we undo it and shake it out, then we select about forty of the nicest and longest strands, having as nearly as possible an equal thickness. There are always one or two unsatisfactory strands in every bundle. Those with a hard, green edge are not nice to work with, for they split as we twist them round the crochet-hook. We knot our strands of raffia together, cutting away any thin, straggling ends, and winding it round a postcard as we join it.

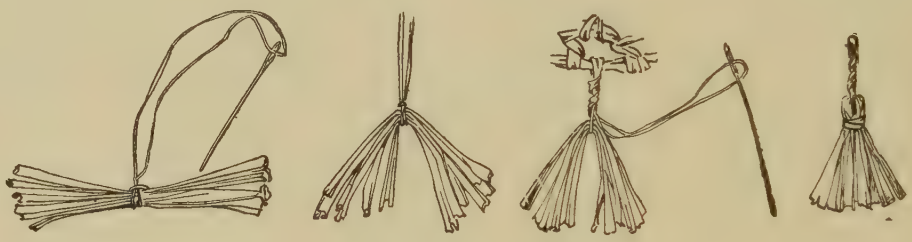
How to join the raffia.

The knot to use is shown in picture 1. We tighten it by pulling both ends and both strands from either side *together* and then pinch the ends back along the strand with the fingers to make them lie flat. It is best to leave about an inch, and if the ends do not "work in," we can cut them off from our basket afterward. This is a pleasanter task than it sounds, as the raffia has a very fresh, hay-like smell, which comes out as we handle it.

We must use a bone crochet-hook of medium size, and the secret of success is to work very loosely. Each loop must be sufficiently large for the next one to be pulled through easily.

To begin our bag, we make 20 chain stitches; return, making one treble into each alternate chain, missing the chain in between, but making one chain between the trebles. The next row is made of one double crochet into the hole formed between the two trebles, and one chain in between each double crochet, so that there will be 10 chain and 10 double crochets in each row. This makes the body of our basket, and is continued backward and forward for 22 rows. The 23d row is the same as the 2d—a line of trebles and chain. We must adjust with our fingers, and straighten out our work if necessary, as we go along. We finish off in the usual way, and press our strip of work with a warm iron.

Any projecting "ends" are now snipped off with the scissors, and we proceed to make a bag of our strip by folding it in half and joining the two sides. To do this we take a darning-needle with a big eye, and thread it with a *thin* strand of raffia, and sew the sides together with over-and-over stitches. If neatly done, the joining will hardly show. The four tassels ornamenting the bottom of our bag are made of six or seven stout strands 3 inches long. We tie them across the centre, as shown in picture 3, with a double strip of fine raffia, threaded through a needle. We must pull it tight, and pinch the two ends together, as shown in picture 4. But before we quite finish the tassel, or give it its little "waist," we attach it to the bottom of the basket by passing the needle through a double stitch, drawing the tassel nearly up to the basket, leaving ¼ inch of raffia, round which we wind our thread. We insert the needle in the tassel again, and come out just low enough to make the "waist," as shown in picture 4. A double twist round the raffia will do for this, and then we make a knot to keep the bind firm by making a buttonhole stitch into the bind. We pull it tight, and cut off our thread, leaving the end as



How a raffia tassel is made

The bag complete.

long as the tassel. We do not cut it off short, because raffia is so springy that it might come undone. There are four tassels, and each one is, of course, made and fixed in the same way.

Now for the handle. We take six strands of stout raffia, 13 inches long, and braid them together in twos, tying the ends for the time being with a piece of cotton to keep them together. To fix the handle to the basket, we undo one end of our braid for about 1½ inches, take three strands, and thread them between a treble at the side of the top of the basket. We pull them all together again, and join them to the other three strands with a bind, which is made by winding a thin thread round and round, as we have learned to do for the tassels. For these two tassels we shall need to go round several times, and must finish off with *two* knot stitches this time, for the handle has to bear a greater strain than the tassels on the bottom. We fray out the remaining end of the braid which forms the tassel, and cut off any uneven ends, fix the other side of the handle in just the same way, and our bag is finished.

If the raffia is hard when we buy it, it can be plunged into hot water and left until cold; removed, shaken, and used when dry. It will then have become quite soft and pliable.

THE GAME OF "WHAT IS WRONG?"

SOME games teach us how to use our bodies and others teach us to use our brains. The game of "What is Wrong?" develops the mind by testing our powers of observation.

We all know that in every house certain things have a regular place. For instance, we may have a clock on the mantelpiece and standing on each side of it a vase.

We may possibly get so used to seeing a photograph placed at a certain angle upon a certain spot that it seems to become part of the room, and we cannot imagine it in any other place except that which it occupies. We feel sure that if it were shifted to any other spot we should notice the fact at once. In all probability if instead of a little thing like a photograph, a large piece of furniture were moved, we should notice it quickly. But it is really wonderful what we do not see, even when we are looking at things, if our mind is not actively concentrated and our power of observation is not acute.

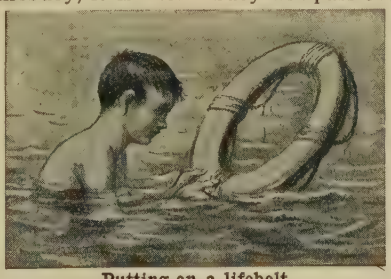
In playing the game of "What is Wrong?" one player stays in the room while all the others go outside the door. The player in the room makes some little alteration in the position of a thing that usually stands upon a certain spot, or is placed in a certain way, and when he admits the other players he asks them what is wrong. The players, as they discover what is wrong, sit down until all have made the discovery or given it up. Then the player who first found out what had been changed remains in the room and moves something in his turn while the others are outside, and so on. Before we begin to play the game we should fix a certain time, say, two minutes, in which the changed object must be pointed out. If in that time no player succeeds in discovering the thing that has been moved or altered, then the thing is shown, and the players go outside again, the same player remaining in the room and altering the position of something else. If we like, we may give points for success. The one who remains in the room scores five points if his alteration is not discovered by any of the others. If, on the other hand, the changed object is discovered, then the first discoverer scores five points. At the end of the play we count up the points, and the player who has scored the greatest number wins the game.

A variation of the game is for the player who remains in the room to change not one object only, but a number. The other players then have more to discover, and there is less constant walking in and out of the room.

There are many things that we may alter in every room. For instance, we might turn a photograph upside down in its frame; if the poker is kept on one side of the fireplace, we can change it to the other side. If a piece of music is on the piano, we may turn it upside down. Vases may be changed, and pictures that hang at an angle from the wall may be made to hang flat against the wall; books may be turned over on the table so that their front cover is downward. In fact, the number of things that can be altered is almost endless, and the game can be played in any room that is available.

THE RIGHT WAY TO USE A LIFEBUOY

IN case we may ever be in circumstances where we should need a lifebuoy, it is well that we should know exactly how to use it. It is of very little use to seize the lifebuoy with the hands and merely hold on to it from the outside. We need to get inside the circle with our arms resting on top, and then we get the full value of its support in the water. The best method of getting into the buoy is to seize one side of it with both hands as shown in the picture, and then to press down that side of the buoy so that it does a somersault. If at the moment the buoy turns over with the pressure of our hands on one side we duck our head, the buoy will pass over the head, and all we have to do then is to draw our arms up and out on top. If we can get hold of a lifebuoy for a short time in a swimming pool, it is interesting to practice getting into it in the way described, and it certainly requires some little practice. Many persons have got into disastrous difficulties through not knowing this simple rule. They have tried all sorts of ways of getting into the lifebuoy, usually without success, and then failure has led to really serious trouble, the least being a thorough ducking.



Putting on a lifebelt.

THE PUZZLES OF THE WIZARD KING

1. TRANSPOSITIONS

Complete, I am a letter strongly pronounced; behead twice, I am a robber; behead again, I am angry; behead again, I value; behead again, I am the past tense of a verb meaning to devour; curtail, I am a preposition; restore to "value" and transpose, I lacerate; curtail, I am a beverage; restore to "lacerate" and behead, I am part of the head; transpose, I am a space of time; restore to "value" and curtail, I am an animal; reverse, I am a sailor.

2. SINGLE ACROSTIC

My initials will form the name of a great statesman.

(a) A game; (b) a flower; (c) an animal; (d) a weapon; (e) a bag; (f) a town in France; (g) a precious stone; (h) a girl's name; (i) a tree.

3. THE DINER'S REPLY

A gentleman was seen coming out of a restaurant by a friend, who said to him:

"Well, did you have a good meal?"

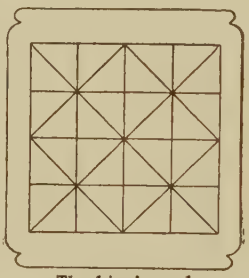
The gentleman replied in the following curious way:

"I 80."

Can you say what he meant?

4. THE MAGIC SEAL

This strange seal was used by an Eastern king upon all his state documents, and it was a favorite habit of his to ask all who came to the court, and those to whom he sent letters and commands, to count the number of triangles of all sizes in the square design in the middle of the seal. The courtiers spent a great deal of their time trying to solve the problem that had been set. Some gave one number and some another. How many triangles are there?



The king's seal.

5. RIDDLE-ME-REE

My first is in mountain, but not in hill;
My second's in river, but not in rill;
My third is in corn, but not in rice;
My fourth is in snow, but not in ice;
My fifth is in rye, but not in oat;
My sixth is in ship, but not in boat;
My seventh's in stone, but not in slate;
My eighth is in soon, but not in late;
My whole, no doubt, will plainly show
A poet great we all do know.

6. ENIGMA

The poet Schiller wrote this verse. Can you guess what he means?

A bridge weaves its arch with pearl
  High over the tranquil sea.
In a moment it unfurls
  Its span, unbounded, free.
The tallest ship, with swelling sail,
  May pass 'neath its arch with ease,
It carries no burden, 'tis too frail,
  And when you approach it flees.
With the flood it comes, with the rain it goes,
And what it is made of nobody knows.

7. DOUBLE ACROSTIC

My initials give a poet, if you read them with ease;
Finals, one of his poems, which many will please.

1. A bold, daring person, who goes forth for fame.
2. With meadow or prairie you will find this the same.
3. To ensnare or beguile by this word is said.
4. And Socrates wooed her when she was a maid.
5. A poet of Italy next you must find.
6. Merriment reversed, at least to my mind.
7. A very simple thing, easy to write.
8. One or t'other, not both, this word doth indite.
9. Full of guilt, but conscience-struck.
10. To jerk, to tug, it is my luck.
11. A lake that bathes Canadian shore.
12. Palsied like this, my last I could not reach.
13. As in the wild, the ground it hurries o'er.

8. CHARADES

My first may spring from a gray goose wing;
  A king is but my second;
Of the works of men my third has been
  The bravest object reckoned.
And without my first my whole would be
A thing unknown to you and to me.

9. THE PUZZLING BIRDS

Two birds were talking one fine day,
  About each other's names.
The one cried out: "Now come let's play
  At little children's games."
"Done!" cried the other, "but I've no head
  For puzzles, you'll agree;
Give me your head, and have instead
  The head that owneth me."
The first agreed, and his looks sable
  Part of a ship became!
The other was a vegetable,
  And neither knew his name!

What were the birds?

10. BURIED FLOWERS

Shall I put this scrap in Kate's album?

Tell your father I called to see him.

What lovely hair! I should like mine to curl like it.

If that man is insane, money should not be given him.

My cousin Ada is your sister-in-law.

My brother is gone to Japan, Syria, and India.

Will Mr. Carlo be liable for this?

Hark! how Tom and Sarah are bellowing in the nursery.

I read to that poor negro several times a week.

This case is urgent; I anticipate a good sum.

11. TWO SHORT YEARS

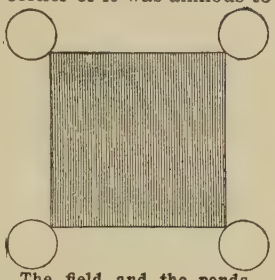
Why was the year 1888 so short? If you know, can you say why the year 1889 was shorter still?

12. SQUARE WORDS

1. A hunt; a hut; to take advantage of; a French river; a girl's name.
2. Not wild; a field; to signify; an Irish lake.

13. THE FIELD AND THE PONDS

A farmer who had a square field with a round pond at each corner of it was anxious to double the size of the field and still have the four ponds on the borders of the field. But he wanted to keep the field square in shape. This is a diagram of the field and ponds as they were originally. How did the farmer double the size of the field, keep it square, and yet manage to have the four ponds on the borders, as he wished to do?



The field and the ponds.

14. CONUNDRUMS

What is the only thing that can live in the midst of fire?

When may a bird be said to occupy a feather bed?

Which is the longest letter in the alphabet?

Which word is shorter for having a syllable added to it?

What is that which by losing an eye has nothing left but a nose?

Which is the best way to make a coat last?

What is that which nobody wishes to have and nobody likes to lose?

The answers to these puzzles will be found on page 6781.

A SHORT-CUT IN ARITHMETIC

Here is an easy way to multiply together any two numbers between twelve and twenty. First multiply together the units digits (or the right hand figures), and write down the result. Then add one of the numbers and the units digit of the other. Write down this result underneath the first result and one place to the left, and add these two. For instance to multiply 18 and 14:

Multiply the units digits (the figures on the right)	8	4	32
Add one number to the units digit of the other	18	4	22
			252

ANSWERS TO PUZZLES ON PAGES 6521 AND 6522

1. Spokes: 1. Iota; 2. Idyl; 3. Ibis; 4. Iron; 5. Idol; 6. Isis; 7. Iris; 8. Isle Tire: "Alps on Alps arise." Pope.

Inner Circles: 1. Try, and you will soon find it all. 2. Oh do be sure to discover this all.

2. Begin with the first bracketed words, and then read the words above and so on.

Do not covet all you see, for he who covets all he sees often wants more than he sees.

Do not tell all you hear, for he who tells all he hears often tells more than he hears.

Do not spend all you have, for he who spends all he has often spends more than he has.

Do not say all you know, for he who says all he knows often says more than he knows.

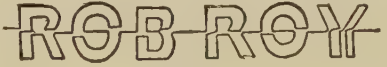
3. Roach, shad, cod, herring, turbot, barbel.

4. BLIND
LOVER
IVORY
NERVE
DRYER

5. A river.

6. Cowslip—Buttercup.

7. The diagram shows the course of the pen. In order to make this clear, spaces are



left where the lines should be extended so as to meet.

8. Between the dark and the daylight,
When the night is beginning to lower,
Comes a pause in the day's occupations
That is known as the children's hour.

9. Leaves, eaves, aves, save.

10. The squirrel takes out one ear of corn each day, and his own two ears.

11. The letters are L, B, T, O, D, J (jay), P and A (aye).

12. (a) Titus Andronicus; (b) William Shakespeare; (c) Cornelius; (d) Cleopatra; (e) Duchess of Gloster; (f) John of Gaunt; (g) Coriolanus; (h) Andromache.

HOW TO MOVE A PENNY WITHOUT TOUCHING IT

THERE are many coin tricks with which we can amuse ourselves and entertain our friends, and one of the simplest is that of moving a penny without touching it. To perform this trick we require five or six coins.

We should see that the table has a smooth surface, otherwise the trick will not work successfully. Placing a penny on the table, we ask the company present: "Can anyone move this coin without pushing the table, or touching the coin with the body, or with anything held in the hand or mouth, and without blowing it?

We take four or five other coins, and place them all in a line at the edge of the table. Each coin must just touch the coin adjoining, and the coin that we are to move without touching must be the coin at the left-hand end of the line.

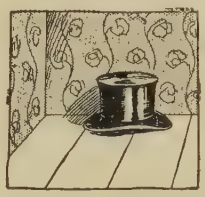
We then press firmly on the coin at the right-hand end of the line, so that it is impossible to move it. Then we take another coin, and pressing upon it with the first finger of the right hand, we slide it along quickly so that it gives a smart tap to the coin that we are holding down. Instantly the coin at the other end of the line will move along an inch or two, although the coin that we tapped has not moved at all.

The reason why the end coin behaves in this manner is easily explained. When the first coin is struck, energy is imparted to the struck coin, and this energy is transmitted from one coin to another until the end coin, having nothing to stop its progress, moves along.

HINTS AND TRICKS FOR ODD MOMENTS

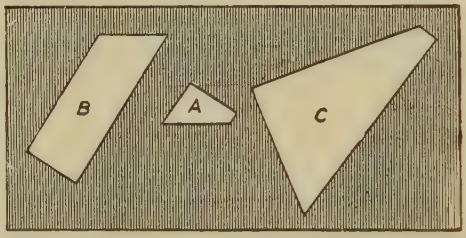
HOW HIGH IS THE HAT?

OUR eyes play us many tricks, and they often deceive us as to the size or height of anything. The apparent height of a hat, for instance, may be very much greater, or it may be less, than it really is. There is an interesting experiment by which we may prove this to ourselves. We should place some mark on a wall to show how high up we think the top of a tall silk hat will come when the hat is stood on the floor against the wall. It seems a very simple and easy thing to give a fairly accurate estimate, but we shall probably be hopelessly out. Let us mark the estimated height first, and then see how accurate we are, by placing the hat against the wall, as shown in the picture. It will spoil the amusement and stop the surprise if we say here whether the estimate is likely to be greater or less than the real height.



TO FORM A SQUARE

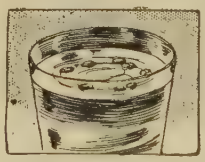
CUT out ten pieces of card—two of the size and shape of *A*, four of *B*, and four of *C*—and then arrange them in such a way that they will form a perfect square. When they are jumbled up it seems impossible that they could



be made into a square, and when we try to put them together it seems equally impossible; but with perseverance we shall be successful.

A WHIRLPOOL IN A TUMBLER

IF we fill a tumbler with water and throw upon the surface some thin shavings of camphor, these will instantly begin to move about and give the appearance of a miniature whirlpool, the movement continuing for some time. But if we now dip into the water anything that is greasy—as, for instance, the end of a pencil that has been rubbed with oil—the particles of camphor will dart to the sides of the glass, and the motions will cease immediately.



A GOAT MADE FROM A PEAR

HERE is a picture of a goat made from a pear with the aid of four matches, an almond, and some raisin-stems. We stick the matches into the pear as shown, then we get a well-shaped almond from its shell to form the head, and into this we stick curved raisin-stems for horns, two or three stems for a beard, two short stems for ears, and the whole is fixed to the end of the pear by means of a piece of match or toothpick, thus forming the neck of the goat. A hole is cut on each side of the almond for the eyes. With a little ingenuity and practice we can make other animals from the different kinds of fruit.

A WAY OF MEASURING A TREE

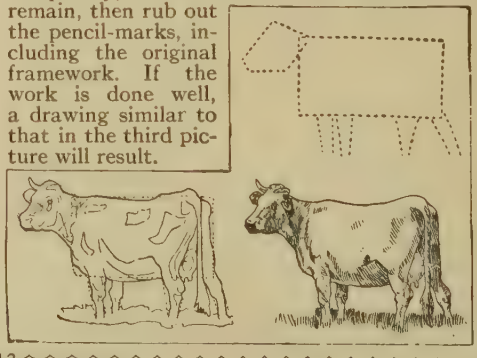
SOME of the natives of South America have a curious way of measuring the height of a tree or tower. They turn their backs to the tree, and walk away from it until they come to a spot where, keeping their backs to the tree, they can, by stooping down and looking between their legs, see the top of the tree. Then they make a mark on the ground, and the distance from this mark to the base of the tree is, roughly, the height of the tree.

WRITING WITH INK ON WOOD

WRITING with pen and ink upon ordinary wood is difficult, for as soon as the words are written, the ink begins to run, and if the pen has been well filled, the words become a mere blur in a few moments, no matter how well they may have been written. To avoid this running of the ink, a very simple precaution is to rub the wood with powdered resin.

A SIMPLE WAY TO DRAW A COW

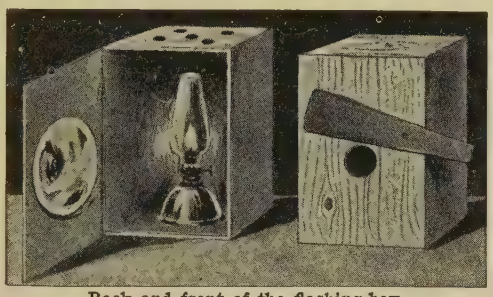
HERE is a simple way of drawing a cow. Begin by making a rough pencil outline of the shape of the cow, as in the first picture, getting the proportions correct. Then begin to fill in the details of the animal, as in the second picture, and it will be found that the rough outline first drawn is a great help in making the sketch. When the cow is drawn in completely, ink over the lines that are to remain, then rub out the pencil-marks, including the original framework. If the work is done well, a drawing similar to that in the third picture will result.



FLASHING MESSAGES AT NIGHT

IF the instructions given below are followed anyone can make a little instrument by which he can flash messages to his friends at night across considerable distances. The idea of the instrument is something like that of the heliograph which soldiers use for sending messages to one another in daylight. The word heliograph really means to write by the sun, and the instrument consists of a little looking-glass that can be twisted about on a stand so as to catch the sunlight, and make flashes that are seen at a distant point.

The instrument we are going to make is very simple. First of all we obtain from the grocer a wooden box about 1 foot high by 9 inches wide, and 9 inches deep; the box should have a hinged lid. Inside this we are going to place a lamp, so we bore in the top a few holes, ½ an inch in diameter, to allow the fumes, or smoke, to escape. Then in the bottom of the box, which will be the front when it is stood up on end for use, we make a round hole 1 inch in diameter. Now on the inside of the lid of the box we hang a reflector of some kind to strengthen the light. The reflector from an old kitchen lamp, polished up, will do very well, or even a piece of ordinary looking-glass.



Back and front of the flashing-box.

We also want a shutter on the front of the box that can be used to open and close the round hole through which we shall flash our messages. The best thing for the shutter is a piece of sheet zinc, which can be bought at a hardware store. The shopkeeper will cut the zinc to the size and shape required. It should be of the shape shown in the picture, and should be about 8 inches long and 2½ inches wide at its broadest end. A hole must be punched near the middle, and it is fixed in position, as shown in the picture, with a screw. The zinc must work quite easily and smoothly on the screw, otherwise there will be some difficulty in working the instrument.

Inside the box we place a lighted candle or small paraffin lamp, and our instrument is then ready for use. Any code of signals can be arranged between two friends, but the most sensible thing to use is the Morse alphabet, giving a short flash for a dot and a long flash for a dash. To make the flashes we hold the shutter by the handle, and work it up and down over the round hole. A little practice will make this quite easy.

Our friend, if he wishes to carry on a conversation with us over a distance, must have a similar instrument. With two flash-boxes it is possible for two friends to talk to one another by flashes at night across a distance of half a mile or sometimes double that.

We begin by placing our boxes each in a window facing the window of the other, and a few rapid flashes indicate that we are going to begin the conversation. When a boy knows the Morse alphabet, which can be found in any encyclopedia, it is astonishing how quickly, with a little practice, he can flash out messages and read those that are flashed back.

This instrument is not a mere toy. To be able to send and read messages which are sent in this way is very necessary and useful. Scouts should make themselves a similar box, and practice this signaling until perfect.

SOLUTIONS OF THE ANAGRAMS

ON page 6520, which gives a description of what an anagram is, and tells how anagrams may be formed, a number of words and phrases are given from which good anagrams can be made. The following are the solutions of these anagram puzzles, although it must be distinctly understood that these are not necessarily the only solutions: *Catalogues* will give "Got as a clue." *Christianity* gives "I cry that I sin." From *Crocodile* we get "Cool'd rice"; and from *Lawyers* "Sly ware." *Melodrama* provides "Made moral"; and from *Midshipman* comes "Mind his map"; *Parishioners* will give "I hire parsons"; *Presbyterian* gives "Best in prayer"; and from *Soldiers* we have "Lo! I dress."

Some words are given in which the article before them is to be used in the anagram. *The calceolaria* gives "Eat coal, Charlie." *The nightingale* will make "High gale in tent"; and from *The turtle-dove* we get "Eve, let truth do." The phrase *Is pity love?* provides, in reply to the question, the anagram "Positively"; and from *Poorhouse* we have "O sour hope," which most will agree is a very appropriate anagram according to the popular idea of the poorhouse.

The following is the list of names with their anagrams: *John Abernethy*, "Johnny the bear"; *Thomas Carlyle*, "Cry shame to all"; *Charles James Stuart*, "Charles, a just master"; *Henry Wadsworth Longfellow*, "Won half the New World's glory"; *Alfred Tennyson—poet laureate*, "Neat sonnet or deep tearful lay"; *Sir Robert Peel*, "Terrible prose"; *William Shakespeare*, "I ask me has Will a peer"; *Robert Southey*, "Robust hero yet"; *George Thompson*, "O go! the negro's M.P." *Thomas Carlyle* gives several other anagrams in addition to the one mentioned above. We have from the letters composing the great thinker's name the following: "Mercy, lash a lot"; "A lot cry 'Lash me' "; "A calm, holy rest"; "Clearly to sham." The examples given will show that the mental exercise obtained in thinking out anagrams is by no means trifling.

TWO CURIOUS KINDS OF PICTURES

MOST of us have seen those long-drawn-out and distorted pictures which appear at first sight to represent nothing in particular, but when held close to the eye and looked at horizontally show a clear and normal picture. These distorted drawings are not made haphazard, but are produced from proper pictures by a scientific plan that must be worked out in a mathematically correct manner. Very few people know how to make a distorted drawing from an ordinary picture, and yet it is quite easy, and can be done by any boy or girl who exercises ordinary care, intelligence and patience.

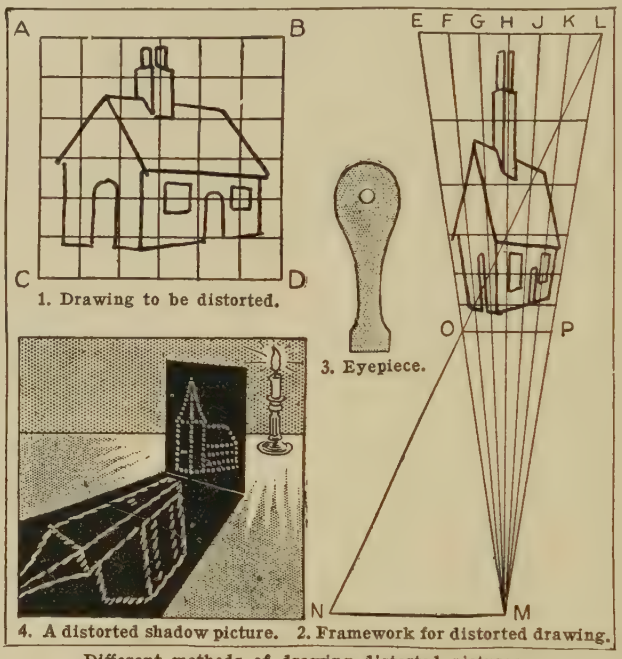
First of all we take the normal picture, which may be either an outline picture from a book or paper or a drawing made by ourselves. Round this we draw a square, *ABCD*, as in picture 1. Then we divide the sides *AB* and *AC* into six equal parts, and draw lines perpendicularly and horizontally, so as to divide the whole square into thirty-six equal and smaller squares.

Now we draw another line, *EL*, equal in length to *AB*, and divide this also into six equal parts. From the middle point, *H*, we draw a line, *HM*, at right angles to *EL*, and the line *HM* may be any length. The greater the length of this line the greater will be the distortion of our freak picture. A very convenient and suitable length for the line is about three times the length of the line *EL*.

Now we draw straight lines from *M* to each of the other points in the line *EL*, and from *M* we draw a line *MN* to the left of *M*. This should be parallel to *EL*, and about half the length of that line, although it may vary a great deal, for the distance from *M* to *N* is really the distance of the point above *M* from which we shall have to view our distorted picture to bring it back to the normal proportions.

The effect of making the line *MN* greater or less is to produce a distorted picture that will have to be viewed from a greater or less height. Join *N* and *L* by a straight line, and where it cuts *ME*, at the point *O*, draw the line *OP* parallel to *EL*. Then, where *NL* cuts the other lines, *FM*, *GM*, *HM*, *JM*, *KM*, draw lines parallel to *EL*, as shown in picture 2. We now have a four-sided figure, *ELOP*, divided into thirty-six sections. These correspond to the thirty-six sections of *ABCD*, and all we have to do is to draw in each section of *ELOP* that portion of the picture which appears in its corresponding section in *ABCD*, taking care to elongate, or stretch out, the lines of the drawing to fill the space, and join up with that part of the drawing which comes in the next section. Pictures 1 and 2 will show how this is done, and we can compare the normal and the distorted pictures, section by section.

To view the distorted picture in such a way as to bring it back to its proper shape, we cut out a little strip of card, as in picture 3, and, pricking a hole with a large pin or bodkin, we look through this hole at the distorted picture, taking care to keep the little card, or view-finder, as high above *M* as *N* is distant from *M*. Of course we can draw our framework for the picture in thin pencil-lines, and then, when we have drawn and inked in our distorted sketch, we can rub out the pencil-lines, so that only the picture is left.



1. Drawing to be distorted.

3. Eyepiece.

4. A distorted shadow picture.

2. Framework for distorted drawing.

Different methods of drawing distorted pictures.

The proper name for these curious optical drawings is "anamorphoses," a word which looks very difficult, but is really made up of two Greek words meaning "to form again." There is another very good way of making a distorted picture. We sketch the design or object upon a piece of white cardboard, and then prick all the lines with a fine pin or needle, so that the whole picture is outlined in every part by a series of small, clean holes going right through the cardboard, as in picture 4. We then fix the card in a perpendicular position, with a strong light behind it.

On the table in front of the pricked card we lay another white card, and the lines of light made by the rays of light shining through the holes in the upright card form a distorted representation of the pricked picture. We draw over this distorted picture with a pencil or pen, and then, in order to view the picture properly so that it will appear to be normal, we must look through a view-finder with the eyehole at the spot where the light was when we drew the picture.

A HANDFUL OF STRAW AND AN INDIAN

THE fierce-looking Indian shown in the picture is made almost entirely of straw; it is quite simple to make if the picture is closely studied as a copy.

Besides a bundle of straw, we need some odd pieces of narrow ribbon—the sort that is called baby ribbon—a piece of bright colored blanket, a twig, some thin wire, a piece of string, and two black beads.

First take a handful of straw—about 20 pieces should be enough—tie them together with the ribbon about 2 inches down to make the neck. We are going to make our Indian about 6 inches high; if you prefer to make him taller, of course it is quite easy to alter the measurements in proportion. Tie the straw again about 2 inches farther down still for the waist. Now divide the bundle into halves to form legs. Tie the straw again at the knees and finally at the bottom, where the ankles come. The feet are made of short lengths of straw tied on neatly at the ankle with the baby ribbon.

The straw Indian made as described.

Give the man a pair of arms by fixing on each side 5 straws, halfway between the neck and the waist; tie them ½ inch from the bottom to form the wrist, and the ends will give the fingers, which can be reduced to natural lengths by the aid of a pair of scissors. If the arms are fixed on with fine wire, they will keep in position better than if ribbon or string is used.

Now we have still to make the head. With the loose pieces of straw at the top as a foundation, fix on with wire about 8 short pieces of straw. Cut these in the manner shown in the picture, to form the face and back head decoration, which will look exactly like an Indian's feathers. Bind a few pieces of the upstanding straw around the head to give it shape, and leave the remaining pieces to make more feathers. Then cut the short straws so that they will represent the forehead, nose and chin respectively; thread the beads with wire, and fix them in the correct position for the eyes.

The blanket, of course, must be draped about the body and secured with a couple of pins, or sewed with a needle and thread. Every boy knows how to make a bow out of a twig and a piece of string, and an arrow of straw, and with these our Indian is complete.

METHODS OF MAKING A BOAT LEAK-PROOF

AS you may already know, it is often quite a difficult job to recondition a boat in the spring, after several months or more of storage in a dry place. Sometimes a submersion of several days' duration takes up the seams and makes them absolutely tight. Of course much depends upon the skill of the builder and the material put into the boat. If this doesn't make the boat tight, a complete overhauling with a raking-out of seams, and fresh calking, then the application of two or three coats of paint will do the work.

Another method of rendering a boat leak-proof, and a method that is claimed to keep it tight for years is to coat the hull with marine glue, made especially for the purpose, then to apply a good grade of unbleached cotton cloth, and to iron it down into the glue. Marine glue can be obtained from any ship chandler or other dealer in water craft, and directions usually come with it.

A brief description here of the process of waterproofing may convince you that this is a desirable method to adopt in putting your boat or boats in condition for the coming vacation. The first step is a thorough cleaning of the hull and sides, including the removal of all loose paint. If the boat has a flat bottom, and the sides are in one piece, the waterproofing may be carried over the bottom and lapped 2 inches over the side boards. Otherwise, the waterproofing should be carried up to the gunwales. Of course it must be carried up over the seams at both the stern and bow.

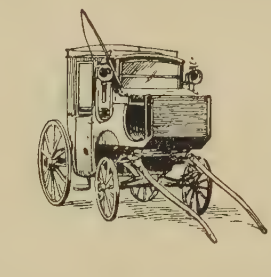
The covering material should be a heavy grade of unbleached muslin. This comes in wide widths, and if your boat is without a keel you can possibly get it wide enough to apply in one piece. For a boat with keel use two strips, one each side of the keel. Buy a package of ½-inch copper tacks for tacking. After cleaning the boat and removing trim strips, under which the waterproofing should go, put the glue in a pot and melt as directed. Then brush the glue thickly over the hull. The glue sets quickly as it chills.

When the hull has been coated, and you have patched places where your brush skipped, spread out the cloth, fit it neatly over the surface, pulling it where necessary to make it conform to the shape of the hull, and fasten with the copper tacks. Then heat several flatirons, or get an electric iron if you can, and, beginning at the stern, rub the iron over the cloth. The purpose of the iron is to sweat or melt the glue under the cloth, and draw it up into the pores of the cloth. As these results are obtained move the iron to another spot, and continue in this way until every inch of the cloth is permeated with the glue, and the surface is smooth.

When the waterproofing and cloth have been applied, give the surfaces a good coat of shellac, then two or three coats of paint.

THE NEXT THINGS TO MAKE AND TO DO ARE ON PAGE 6777.

CAN YOU READ THESE NAMES OF PLANTS?



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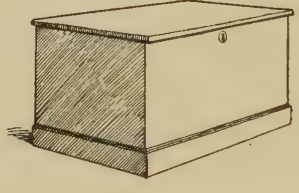

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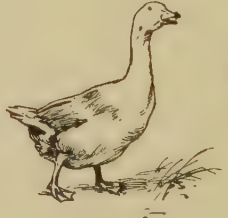


Study these sets of pictures carefully. By putting together the names of the objects in each set we are able to read the names of ten American plants. The correct solutions to this puzzle are on page 6780.

A POEM OF THE SKY

IN any selection from Shelley's poetry The Cloud always finds a place, as it is at once characteristic of the author and presents in the most finished poetic style, with a rare wealth of imagery and pictorial truth, a simple scientific explanation of how clouds are formed. We could tell in a very few words, of course, the process of Nature which results in the formation and the dissolving of a cloud, but the poet has here chosen to show us that simple facts can be clothed with words and images which invest them with beauty.

THE CLOUD

CONTINUED FROM 6472

I BRING fresh showers for the thirsting flowers
From the seas and the streams;
I bear light shade for the leaves when laid
In their noonday dreams.
From my wings are shaken the dews that waken
The sweet buds every one,
When rocked to rest on their mother's breast,
As she dances about the sun.
I wield the flail of the lashing hail,
And whiten the green plains under;
And then again I dissolve it in rain,
And laugh as I pass in thunder.

I sift the snow on the mountains below,
And their great pines groan aghast;
And all the night 'tis my pillow white,
While I sleep in the arms of the blast.
Sublime on the towers of my skyey bowers,
Lightning, my pilot, sits;
In a cavern under is fettered the thunder,
It struggles and howls at fits.
Over earth and ocean, with gentle motion,
This pilot is guiding me,
Lured by the love of the Genii that move
In the depths of the purple sea;
Over the rills, and the crags, and the hills,
Over the lakes and the plains,
Wherever he dream, under mountain or stream,
The Spirit he loves remains;
And I all the while bask in heaven's blue smile,
Whilst he is dissolving in rains.

The sanguine Sunrise, with his meteor eyes,
And his burning plumes outspread,
Leaps on the back of my sailing rack,
When the morning star shines dead,
As, on the jag of a mountain-crag,
Which an earthquake rocks and swings,
An eagle alit one moment may sit
In the light of its golden wings.
And, when Sunset may breathe, from the lit sea beneath,
Its ardours of rest and of love,
And the crimson pall of eve may fall
From the depth of heaven above,
With wings folded I rest on mine airy nest,
As still as a brooding dove.

That orbèd maiden, with white fire laden,
Whom mortals call the Moon,
Glides glimmering o'er my fleece-like floor,
By the midnight breezes strewn;
And wherever the beat of her unseen feet,
Which only the angels hear,
May have broken the woof of my tent's thin roof,
The Stars peep behind her and peer.
And I laugh to see them whirl and flee
Like a swarm of golden bees,
When I widen the rent in my wind-built tent,
Till the calm rivers, lakes, and seas,
Like strips of the sky fallen through me on high,
Are each paved with the moon and these.

I bind the Sun's throne with a burning zone,
And the Moon's with a girdle of pearl;
The volcanoes are dim, and the Stars reel and swim,
When the whirlwinds my banner unfurl.
From cape to cape, with a bridge-like shape,
Over a torrent sea,
Sunbeam-proof, I hang like a roof;
The mountains its columns be.
The triumphal arch through which I march,
With hurricane, fire, and snow,
When the Powers of the air are chained to my chair,
Is the million-coloured bow;
The Sphere-fire above its soft colours wove,
While the moist Earth was laughing below.

I am the daughter of Earth and Water,
And the nursling of the Sky:
I pass through the pores of the ocean and shores;
I change, but I cannot die.
For after the rain, when with never a stain
The pavilion of heaven is bare,
And the winds and sunbeams, with their convex gleams
Build up the blue dome of air,
I silently laugh at my own cenotaph,
And out of the caverns of rain,
Like a child from the womb, like a ghost from the tomb,
I arise, and unbuild it again.

THE BETTER LAND

Although Mrs. Hemans was a somewhat sentimental poet, and inclined to dwell too much on the gloomy side of life, a good many of her pieces are likely long to endure, and none more likely than this song, which has been set to very appropriate music. It touches with dramatic intensity the longing of every feeling heart.

I HEAR thee speak of the better land,
Thou call'st its children a happy band;
Mother! oh, where is that radiant shore?
Shall we not seek it, and weep no more?
Is it where the flower of the orange blows,
And the fire-flies glance through the myrtle boughs?
Not there; not there, my child.

Is it where the feathery palm-trees rise,
And the date grows ripe under sunny skies?
Or 'midst the green islands of glittering seas,
Where fragrant forests perfume the breeze,
And strange bright birds on their starry wings
Bear the rich hues of all glorious things?
Not there; not there, my child.

Is it far away in some region old,
Where the rivers wander o'er sands of gold?
Where the burning rays of the ruby shine,
And the diamond lights up the secret mine,
And the pearl gleams forth from the coral strand—
Is it there, sweet mother, that better land?
Not there; not there, my child.

Eye hath not seen it, my gentle boy,
Earth hath not heard its deep songs of joy;
Dreams cannot picture a world so fair,
Sorrow and death may not enter there;
Time doth not breathe on its fadeless bloom;
For beyond the clouds, and beyond the tomb,
It is there; it is there, my child.

THE KING'S PICTURE

In this poem, by an American writer, Helen B. Bostwick, we have a picturesque illustration of the old saying that there is some touch of good in all things, even where we least expect to find it.

THE king from the council chamber
Came, weary and sore of heart;
He called to Iliff, the painter,
And spoke to him thus apart:
"I'm sickened of faces ignoble,
Hypocrites, cowards, and knaves;
I shall shrink in their shrunken measure,
Chief slave in a realm of slaves.

"Paint me a true man's picture,
Gracious, and wise, and good,
Dowered with the strength of heroes
And the beauty of womanhood.
It shall hang in my inmost chamber,
That, thither when I retire,
It may fill my soul with its grandeur,
And warm it with sacred fire."

So the artist painted the picture,
And it hung in the palace hall;
Never a thing so lovely
Had garnished the stately wall.
The king, with head uncovered,
Gazed on it with rapt delight,
Till it suddenly wore strange meaning—
Baffled his questioning sight.

For the form was the supplest courtier's,
Perfect in every limb;
But the bearing was that of the henchman,
Who filled the flagons for him;
The brow was a priest's, who pondered
His parchment early and late;
The eye was the wandering minstrel's,
Who sang at the palace gate.

The lips, half sad and half mirthful,
With a fitful trembling grace,
Were the very lips of a woman
He had kissed in the market-place;
But the smile which her curves transfigured,
As a rose with its shimmer of dew,
Was the smile of the wife who loved him—
Queen Ethelyn, good and true.

Then, "Learn, O king," said the artist,
"This truth that the picture tells—
That in every form of the human
Some hint of the highest dwells;
That, scanning each living temple
For the place where the veil is thin,
We may gather by beautiful glimpses
The form of the God within."

PLANTING THE APPLE-TREE

The American poet William Cullen Bryant was the author of these verses, which, in all likelihood were suggested to him by his having planted an apple-tree. The planting of any tree is a favorite subject for poets. It leads the mind in the most natural way to think of the continuous growth of the tree, possibly for centuries after the hand that planted it is gone.

COME, let us plant the apple-tree.
Cleave the tough greensward with the spade;
Wide let its hollow bed be made;
There gently lay the roots, and there
Sift the dark mould with kindly care,
And press it o'er them tenderly,
As, round the sleeping infant's feet,
We softly fold the cradle-sheet;
So plant we the apple-tree.

What plant we in this apple-tree?
Buds, which the breath of summer days
Shall lengthen into leafy sprays;
Boughs where the thrush, with crimson breast,
Shall haunt and sing and hide her nest;
We plant, upon the sunny lea,
A shadow for the noontide hour,
A shelter from the summer shower,
When we plant the apple-tree.

What plant we in this apple-tree?
Sweets for a hundred flowery springs
To load the May-wind's restless wings,
When, from the orchard-row, he pours
Its fragrance through our open doors;
A world of blossoms for the bee,
Flowers for the sick girl's silent room,
For the glad infant sprigs of bloom,
We plant with the apple-tree.

What plant we in this apple-tree?
Fruits that shall swell in sunny June,
And redden in the August noon,
And drop, when gentle airs come by,
That fan the blue September sky,
While children come, with cries of glee,
And seek them where the fragrant grass
Betrays their bed to those who pass,
At the foot of the apple-tree.

. . . . . .

The fruitage of this apple-tree,
Winds, and our flag of stripe and star,
Shall bear to coasts that lie afar,

Where men shall wonder at the view,
And ask in what fair groves they grew;
And sojourners beyond the sea
Shall think of childhood's careless day,
And long, long hours of summer play,
In the shade of the apple-tree.

Each year shall give this apple-tree
A broader flush of roseate bloom,
A deeper maze of verdurous gloom,
And loosen, when the frost-clouds lower,
The crisp brown leaves in thicker shower.
The years shall come and pass, but we
Shall hear no longer, where we lie,
The summer's songs, the autumn's sigh,
In the boughs of the apple-tree.

. . . . . .

"Who planted this old apple-tree?"
The children of that distant day
Thus to some aged man shall say;
And, gazing on its mossy stem,
The gray-haired man shall answer them:
"A poet of the land was he,
Born in the rude but good old times;
'Tis said he made some quaint old rhymes
On planting the apple-tree."

RAIN IN SUMMER

Longfellow in the following poem teaches us the many beauties and uses of the rain. When we are a little disappointed with a rainy day it will help us to remember these lovely verses.

HOW beautiful is the rain!
After the dust and the heat,
In the broad and fiery street,
In the narrow lane,
How beautiful is the rain!

How it clatters along the roofs,
Like the tramp of hoofs!
How it gushes and struggles out
From the throat of the overflowing spout!
Across the window-pane
It pours and pours;
And swift and wide,
With a muddy tide,
Like a river down the gutter roars
The rain, the welcome rain!

The sick man from his chamber looks
At the twisted brooks;
He can feel the cool
Breath of each little pool;
His fevered brain
Grows calm again,
And he breathes a blessing on the rain.

From the neighbouring school
Come the boys,
With more than their wonted noise
And commotion;
And down the wet streets
Sail their mimic fleets,
Till the treacherous pool
Engulfs them in its whirling
And turbulent ocean.
In the country on every side,
Where far and wide,
Like a leopard's tawny and spotted hide
Stretches the plain,
To the dry grass and the drier grain
How welcome is the rain!

In the furrowed land
The toilsome and patient oxen stand;
Lifting the yoke-encumbered head,
With their dilated nostrils spread,
They silently inhale
The clover-scented gale,
And the vapours that arise
From the well-watered and smoking soil.
For this rest in the furrow after toil
Their large and lustrous eyes
Seem to thank the Lord,
More than man's spoken word.

Near at hand,
From under the sheltering trees,
The farmer sees
His pastures and his fields of grain,
As they bend their tops
To the numberless beating drops
Of the incessant rain.
He counts it as no sin
That he sees therein
Only his own thrift and gain.

SOMEBODY'S MOTHER

We have here a familiar example of the sentimental verse which was very popular a generation ago, but is now passing out of favor. It is expressed in simple and unaffected words.

THE woman was old and ragged and gray,
And bent with the chill of the winter's day;

The street was wet with a recent snow,
And the woman's feet were aged and slow.

She stood at the crossing, and waited long,
Alone, uncared for, amid the throng

Of human beings who passed her by,
Nor heeded the glance of her anxious eye.

Down the street, with laughter and shout,
Glad in the freedom of "school let out,"

Came the boys like a flock of sheep,
Hailing the snow piled white and deep.

Past the woman so old and gray
Hastened the children on their way,

Nor offered a helping hand to her—
So meek, so timid, afraid to stir

Lest the carriage wheels or the horses' feet
Should crowd her down in the slippery street.

At last came one of the merry troop—
The gayest laddie of all the group;

He paused beside her, and whispered low,
"I'll help you across if you wish to go."

Her aged hand on his strong young arm
She placed, and so, without hurt or harm,

He guided the trembling feet along,
Proud that his own were firm and strong.

Then back again to his friends he went,
His young heart happy and well content.

"She's somebody's mother, boys, you know,
For all she's aged and poor and slow;

"And I hope some fellow will lend a hand
To help *my* mother, you understand,

"If ever she's poor and old and gray,
When her own dear boy is far away."

And "somebody's mother" bowed low her head
In her home that night, and the prayer she said

Was: "God, be kind to the noble boy,
Who is somebody's son and pride and joy!"

AN INDIAN AT THE BURIAL-PLACE OF HIS FATHERS

William Cullen Bryant here suggests the thoughts of a "noble red man" on visiting the burial-place of his fathers. The Indian is a picturesque figure in poetry and fiction, but civilized man, with all his faults, does more to promote the cause of humanity.

IT is the spot I came to seek—
My father's ancient burial-place,
Ere from these vales, ashamed and weak,
Withdrew our wasted race.
It is the spot—I know it well—
Of which our old traditions tell.

For here the upland bank sends out
A ridge toward the river-side;
I know the shaggy hills about,
The meadows smooth and wide,
The plains, that, toward the southern sky,
Fenced east and west by mountains lie.

A white man, gazing on the scene,
Would say a lovely spot was here,
And praise the lawns, so fresh and green,
Between the hills so sheer.
I like it not—I would the plain
Lay in its tall old groves again.

The sheep are on the slopes around,
The cattle in the meadows feed,
And laborers turn the crumbling ground,
Or drop the yellow seed,
And prancing steeds, in trappings gay,
Whirl the bright chariot o'er the way.

Methinks it were a nobler sight
To see these vales in woods arrayed,
Their summits in the golden light,
Their trunks in grateful shade,
And herds of deer, that bounding go
O'er rills and prostrate trees below.

And then to mark the lord of all,
The forest hero trained to wars,
Quivered and plumed, and lithe and tall,
And seamed with glorious scars,
Walk forth, amid his reign, to dare
The wolf, and grapple with the bear.

This bank, in which the dead were laid,
Was sacred when its soil was ours;
Hither the artless Indian maid
Brought wreaths of beads and flowers,
And the gray chief and gifted seer
Worshipped the god of thunders here.

But now the wheat is green and high
On clods that hid the warrior's breast,
And scattered in the furrows lie
The weapons of his rest,
And there, in the loose sand, is thrown
Of his large arm the mouldering bone.

Ah, little thought the strong and brave,
Who bore the lifeless chieftain forth;
Or the young wife, that weeping gave
Her first-born to the earth,
That the pale race, who waste us now,
Among their bones should guide the plough.

They waste us—ay—like April snow
In the warm noon, we shrink away;
And fast they follow, as we go
Towards the setting day—
Till they shall fill the land, and we
Are driven into the western sea.

But I behold a fearful sign,
To which the white men's eyes are blind;
Their race may vanish hence, like mine,
And leave no trace behind,
Save ruins o'er the region spread,
And the white stones above the dead.

Before these fields were shorn and tilled,
Full to the brim our rivers flowed;
The melody of waters filled
The fresh and boundless wood;
And torrents dashed, and rivulets played,
And fountains spouted in the shade.

Those grateful sounds are heard no more,
The springs are silent in the sun,
The rivers by the blackened shore,
With lessening current run;
The realm our tribes are crushed to get
May be a barren desert yet.

THE FLIGHT OF YOUTH *

These beautiful lines by the American poet R. H. Stoddard will long live in our memories. There is a glorious sense of life that comes to us in youth. As age creeps on, this feeling wears away.

THERE are gains for all our losses,
There are balms for all our pains;
But when youth, the dream, departs,
It takes something from our hearts,
And it never comes again.

We are stronger, and are better,
Under manhood's sterner reign:
Still we feel that something sweet
Followed youth, with flying feet,
And will never come again.

Something beautiful is vanished,
And we sigh for it in vain:
We behold it everywhere,
On the earth, and in the air,
But it never comes again.

QUIET WORK

This poem by Matthew Arnold is a sonnet. True to sonnet form, the last six lines are not merely a continuation of the first eight, but contain a change of thought.

ONE lesson, Nature, let me learn of thee,
One lesson which in every wind is blown;
One lesson of two duties kept at one
Though the loud world proclaim their enmity—
Of toil unsevered from tranquillity!
Of labour, that in lasting fruit outgrows
Far noisier schemes, accomplished in repose,
Too great for haste, too high for rivalry!
Yes, while on earth a thousand discords ring,
Man's fitful uproar mingling with his toil,
Still do thy sleepless ministers move on,
Their glorious tasks in silence perfecting;
Still working, blaming still our vain turmoil,
Labourers that shall not fail, when man is gone.

* From Poems of Richard Henry Stoddard, copyright, by Charles Scribner's Sons.

THE APPLE WINDS

In our care-free days of youth we are apt to welcome the winds that blow us good without thought of those to whom they may blow ill. These charming verses are published with Mr. Will H. Ogilvie's permission.

I HAD no thought of stormy sky
In days when I was small,
And all the world was bounded by
Our ten-foot garden wall.

I never thought the storm-winds came
From wrecks and ribboned sails;
I never knew them by their name
Of equinoctial gales;

But sweeping round the orchard bends,
Knee-deep in leaves of brown,
I only knew them as the friends
That shook the apples down!

And I have travelled far and far
And weary miles since then,
And battled where the storm-winds are
That wreck the lives of men;

And back among the lime-tree leaves,
Grown gold before they fall,
I hear the song that autumn weaves
When first the wild winds call;

And though their hand is chill and cold,
Their face has winter's frown,
I know them for the friends of old
That shook the apples down!

I THINK WHEN I READ

Few children's hymns are better known or more often heard in Sunday schools than this beautiful hymn by Mrs. Luke.

I THINK when I read that sweet story of old,
When Jesus was here among men,
How He called little children as lambs to His fold—
I should like to have been with Him then.
I wish that His hands had been placed on my head,
That His arms had been thrown around me,
And that I might have seen His kind look when He said:
"Let the little ones come unto Me."
Yet still to His footstool in prayer I may go,
And ask for a share in His love;
And if I thus earnestly seek Him below,
I shall see Him and hear Him above,
In that beautiful place He has gone to prepare
For all that are washed and forgiven;
And many dear children are gathering there,
"For of such is the kingdom of heaven."

LIFE

Mrs. Barbauld, a well-known writer in her day, is the author of these thoughtful lines, in which is expressed the quiet beauty of a contented and hopeful spirit.

LIFE! I know not what thou art,
But know that thou and I must part;
And when, or how, or where we met,
I own to me's a secret yet.

. . . . . .

Life! We have been long together,
Through pleasant and through cloudy weather;
'Tis hard to part where friends are dear,
Perhaps 'twill cost a sigh, a tear;—
Then steal away, give little warning,
Choose thine own time;
Say not Good-night, but in some brighter clime
Bid me Good-morning!

ONE OF US TWO*

In these verses Ella Wheeler Wilcox seeks to express the pathos of married life broken by death. Shakespeare has pointed the moral in the line in which he says we should "love that well which we must leave ere long."

THE day will dawn when one of us shall hearken
In vain to hear a voice that has grown dumb;
And morns will fade, noons pale, and shadows darken
While sad eyes watch for feet that never come.

One of us two must some time face existence
Alone with memories that but sharpen pain,
And these sweet days shall shine back in the distance,
Like dreams of summer dawns in nights of rain.

One of us two, with tortured heart half broken,
Shall read long-treasured letters through salt tears,
Shall kiss with anguished lips each cherished token
That speaks of these love-crowned, delicious years.

One of us two shall find all light, all beauty,
All joy on earth, a tale for ever done;
Shall know henceforth that life means only duty.
O God! O God! have pity on that one!

GOD SAVE THE KING

National anthems are not always the highest form of poetry, judged from the standpoint of literature. We give here the first and third stanzas. The anthem probably grew from an old rebel song, and is believed to have been set to music, oddly enough, by John Bull, a musician and poet, who was organist to King James I, and who died in 1628.

GOD save our gracious King,
Long live our noble King,
God save the King!
Send him victorious,
Happy and glorious,
Long to reign over us,
God save the King!

Thy choicest gifts in store,
On him be pleased to pour,
Long may he reign.
May he defend our laws,
And ever give us cause,
To sing with heart and voice,
God save the King!

SINCE WE PARTED

SINCE we parted yester eve,
I do love thee, love, believe,
Twelve times dearer, twelve hours longer,—
One dream deeper, one night stronger,
One sun surer,—thus much more
Than I loved thee, love, before.
—EDWARD BULWER LYTTON.

*By courtesy of W. B. Conkey Co.

LITTLE VERSES FOR VERY LITTLE PEOPLE

THERE was a frog lived in a well,
Kitty alone, Kitty alone;
There was a frog lived in a well,
Kitty alone and I.

There was a frog lived in a well,
And a gay mouse in a mill.
Cock me cary, Kitty alone,
Kitty alone and I.

The frog he would a-wooing ride;
Kitty alone, Kitty alone;
The frog he would a-wooing ride,
And on a snail he got astride.
Cock me cary, Kitty alone.

He rode till he came to My Lady Mouse Hall,
Kitty alone, Kitty alone;
He rode till he came to My Lady Mouse Hall,
And there he did both knock and call.
Cock me cary, Kitty alone.

Quoth he, "Miss Mouse, I'm come to thee,"
Kitty alone, Kitty alone;
Quoth he, "Miss Mouse, I'm come to thee,
To see if thou canst fancy me."
Cock me cary, Kitty alone.

Quoth she, "Answer I'll give you none,"
Kitty alone, Kitty alone;
Quoth she, "Answer I'll give you none,
Until my Uncle Rat comes home."
Cock me cary, Kitty alone.

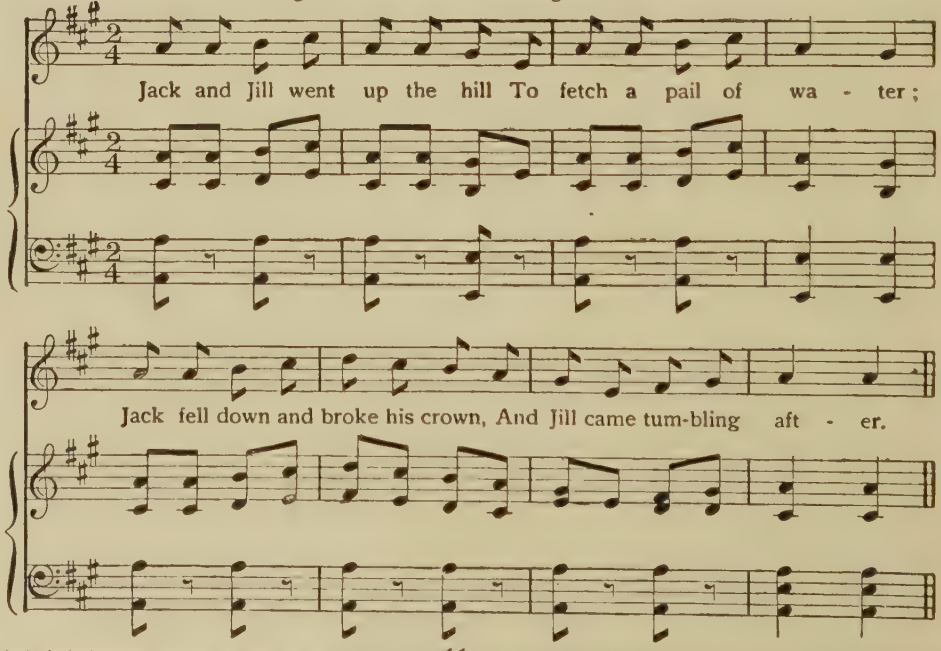
And when her Uncle Rat came home,
Kitty alone, Kitty alone;
And when her Uncle Rat came home,
"Who's been here since I've been gone?"
Cock me cary, Kitty alone.

"Sir, there's been a worthy gentleman,"
Kitty alone, Kitty alone;
"Sir, there's been a worthy gentleman,
That's been here since you've been gone."
Cock me cary, Kitty alone.

The frog he came whistling through the brook,
Kitty alone, Kitty alone;
The frog he came whistling through the brook,
And there he met with a dainty duck.
Cock me cary, Kitty alone.

This duck she swallowed him up with a cluck,
Kitty alone, Kitty alone;
This duck she swallowed him up with a cluck,
So there's an end of my history book.
Cock me cary, Kitty alone.
Kitty alone and I.

JACK AND JILL



SIMPLE SIMON MET A PIEMAN

SIMPLE SIMON met a pieman
Going to the fair;
Says Simple Simon to the pieman:
"Let me taste your ware."
Says the pieman unto Simon:
"First give me your penny!"
Says Simple Simon to the pieman:

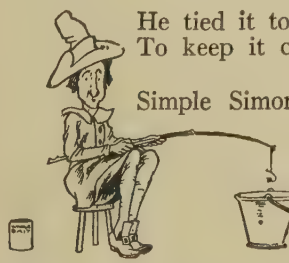
"Indeed, I have not any."

He went to catch a dicky bird,
And thought he would not fail,
Because he had a little salt
To put upon his tail.
He went to ride a spotted cow
That had a little calf;

She threw him down upon the ground,
Which made the people laugh.

Then Simple Simon went a-hunting
For to catch a hare;
He rode a goat about the street,
But could not find one there.
Simple Simon went to town
To buy a piece of meat;

He tied it to his horse's tail
To keep it clean and sweet.

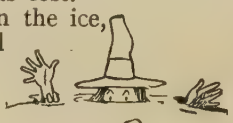


Simple Simon went a-fishing
For to catch a whale,
And all the water he had got
Was in his mother's pail.

He went to take a bird's nest—

'Twas built upon a bough;
A branch gave way,
And Simon fell
Into a dirty slough.
He went to shoot a wild duck,
But the wild duck flew away;
Says Simon: "I can't hit him
Because he will not stay."

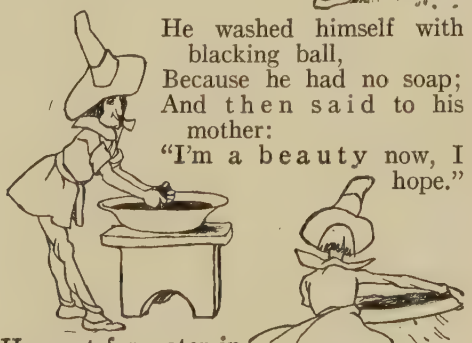
Once Simon made a great snowball,
And brought it in to roast;
He laid it down upon the fire,
And soon the ball was lost.
He went to slide upon the ice,
Before the ice would bear;



Then he plunged in above his knees,
Which made poor Simon stare.

Simple Simon went to look
If plums grew on a thistle;
He pricked his finger very much,
Which made poor Simon whistle.

He washed himself with blacking ball,
Because he had no soap;
And then said to his mother:
"I'm a beauty now, I hope."



He went for water in a sieve,
But soon it all ran through.
And now poor Simple Simon
Bids you all adieu.

FOUR INTERESTING FLOWERS

The Fragrant Evening Primrose with its broad flower and small rosette of narrow leaves.

The broad flower, closely rolled buds and narrow leaves of the Bitter-root, Montana's state flower.

The spider-like flowers and drooping pods of the Rocky Mountain Bee Plant, which is sometimes called Skunkweed.

The flower clusters of the Sulphur Flower as they grow near the foot of the mountain on slender stems a foot high.

Photos, W. J. Cribbs.

Photo, L. B. Brownell, Patterson. The Prickly Pear.

FLOWERS OF NORTH AMERICA

THE FLOWERS OF THE MIDDLE WEST

CONTINUED FROM 6572

PERHAPS the easiest way to make the acquaintance of some of the most conspicuous flowers of the Middle West is to group them according to the regions in which they usually grow. Taking the Rocky Mountains as the great backbone of this part of North America, we may distinguish five regions, or zones, at different altitudes, each having its own set of hundreds of flowers. In all, there are not less than five thousand different flowering plants in the five zones that are easily recognized. These divisions are:

1. The plains, rather dry, level, and almost treeless, with short grass and a profusion of low flowers in the moist months of spring. Farther north this zone may be divided into three prairie steppes, all differing somewhat.

2. The foot-hills, with scattering trees of pine and oak and taller grasses and shrubs. Here the flowering plants are larger and the flowering season is longer.

3. The montane zone, chiefly covered with forests of pine and spruce, with parks or open spaces occupied by meadows. Here the rainfall is good, the forests are dense, and the flower display is magnificent. Several national parks are mostly within this zone.

4. The subalpine zone, including the higher mountain slopes, where the forest trees become shorter but the undergrowth remains luxuriant and the flowers are showy and abundant.

5. The alpine zone, above the forests, often with extensive alpine meadows well carpeted with flowering plants during its short spring and summer. Here all the plants are dwarfed, with short stems and small leaves, but with flowers that retain the full size of those of the lower zones. Many think that the colors are purer and more brilliant than those of the plains and the foot-hills.

In the vicinity of the Rocky Mountain National Park, Colorado, the plains region is mostly below 4,000 feet in altitude, the foot-hills extend from 4,000 to 6,000 feet, at which elevation the montane zone begins. About 9,500 feet marks the upper limits of the montane and the lower of the subalpine zone, while the alpine includes the portions of the mountains above 10,500 feet.

I. FLOWERS OF THE PLAINS AND FOOT-HILLS

In these regions the water supply is rather scanty, so that many plants have small leaves that are economical of the

supply, or thick leaves that store it up for time of need. Other plants are low, or appear above the surface for a short time only. Of the thousands, the following are a few of the more beautiful or more abundant.

THE EVENING PRIMROSES, WITH THEIR BROAD FLOWERS

A tuft of evening primroses
O'er which the mind might hover till it dozes
But that it's ever startled by the leap
Of bud into ripe flowers.

Widely scattered over the plains, and often rather high up on the foot-hills, are several kinds of Evening Primroses *(Œnothera)*. One of the most common is three feet tall, with alternate leaves and large erect buds. About sunset these buds quickly open and display broad yellow flowers, each with four petals that are usually an inch long. A long slender calyx tube supports the corolla a couple of inches above the capsule in which the seeds will be matured.

The closely related White Evening Primrose is also a rather tall plant with pinnatifid leaves and flower buds that droop toward the flowers that are opening on the stem below. Here the four petals are white, becoming pink as they grow older and remaining open during the day. They are sure to attract attention, as the corolla is from two to three inches across.

Some of these splendid flowers are sweet-scented and beautifully shaded with rose, and are known as the Fragrant Primrose, or Rock Rose *(Pachylophus)*. Some of the flowers are more than three inches across, while one of the most widely spread varieties is a low plant where the flowers nestle in the centre of a large prostrate rosette of slender-toothed leaves.

THE EVENING STAR FLOWER, WHICH OPENS AT SUNDOWN

Another flower with the evening-blooming habit has been rather appropriately called the Evening Star Flower *(Mentzelia)*, in spite of its large size. Unlike the night-blooming cereus, the flowers of this plant may open two or three times on successive evenings. It is a stout, loosely branched, herbaceous plant a little over a foot high, with lance-shaped leaves from whose sides project a few large teeth, giving it a thistle-like appearance. Small hooked bristles scattered over the leaves give it the name Stickleaf. The large flowers open at sundown with from five to ten white or light yellow petals, having a spread of three inches and disclosing a hundred or more long slender stamens. Although it can establish little claim to the name, it is sometimes called Prairie Lily or Gunebo Lily, probably because of the form of the white flowers.

THE BUSH MORNING-GLORY, WITH ITS ENORMOUS ROOT SYSTEM

Scattered through the rather dry plains that front the Rocky Mountains from Texas to Montana is found a remarkable Bush Morning-glory *(Ipomœa)*. Its branching stems form a clustering bush two or three feet across about the top of an enormous root as thick as a man's leg, and often quite as long, sometimes weighing as much as twenty-five pounds. This root seems to store water that enables the plant to remain vigorous during the hot, dry summer. The leaves, too, differ from those of the common morning-glory, for they are four or five inches long and very slender, but the flowers are of the familiar funnel shape, often three inches long, delicately shaded with attractive purple and pink.

THE PRICKLY POPPY, WITH ITS DELICATE PETALS

Large white flowers, two or three inches across, make the Prickly Poppy *(Argemone)* conspicuous. The five or six petals are as delicate as tissue-paper, and, like those of all poppies, endure for a short time only. The two or three sepals are adorned with projecting horns, and fall as the flower opens. The flowers are borne on a stout branching plant about two feet high, with prickly stem and bluish green leaves possessing a few rather strong prickles. When broken, the stem exudes a white, milky juice.

ROCKY MOUNTAIN BEE PLANT, SOMETIMES CALLED SKUNKWEED

A plant along the roadside, growing from two to four feet high, with round clusters of reddish purple flowers, so attracts insect visitors as to be known as the Rocky Mountain Bee Plant *(Cleome)*. Its long round pods show that it belongs to the Caper Family. The flowers have four petals, each a half inch long, and six stamens much longer than the petals. The trifoliate leaves are like those of a narrow-leaved clover, and the whole plant has a rather disagreeable odor that has given it the name Skunkweed, but does not detract from its attractive

FORGET-ME-NOTS, ASTERS AND EVENING STAR

The small blue flowers of the False Forget-me-not. The prickly fruit is seen below the flowers.

The drooping flowers of the Bluebell, or Drooping Forget-me-not.

The Daisy-asters with their narrow leaves and broad flowers, common in the Yellowstone National Park, where this photo was made.

The long white buds of the Evening Star Flower (Mentzelia) which after sundown open into great star-like flowers. Photos, W. J. Cribbs.

appearance nor lessen the number of bees that visit it for its nectar.

THE PRAIRIE, OR SAND, LILY, WHICH BLOSSOMS EARLY

The gleaming white flowers of the Sand Lily are among the very earliest to appear in the spring. They are scattered freely over the plains and foot-hills, some reaching into the montane zone. Slender green leaves spring from a short rootstock two or three inches below the surface, and as a loose rosette surround the cluster of six-rayed fragrant white star flowers that are just above the surface of the ground. The silver of the petals is in sharp contrast with the six golden stamens that cluster in the centre. The flowers are an inch across, but the slender perianth tube is over two inches long, reaching down into the ground, so that the ovary is more than an inch below the surface. As the seed ripens, the short stalk on which it is borne elongates and pushes the capsule near the surface, where it remains until thrust out of the ground by the leaves of the following spring.

THE PASQUE FLOWER, WHICH HAS A WIDE RANGE

Pasque means "Easter," for, since the Pasque Flower *(Pulsatilla)* is one of the earliest, it is often in bloom on Easter morning. Widely scattered from Montana, in the north, to Texas, in the south, it reaches eastward through the prairie and westward into the mountains, where it climbs to an elevation of 9,000 feet. The bud appears at the tip of a stem from three to six inches high. It is inclosed in a deeply cut and sharply pointed involucre of gray bracts of silvery hue and shining brightness. Soon the bud expands into a broad cup-like flower of lavender or bluish purple color, shading to white at the base. A central mass of yellow stamens provides a golden lining for the bottom of the cup. The six colored leaves of the flower are called sepals, since there is no green calyx to infold them. Each is over an inch long, and as they fade and fall, a rosette of finely divided leaves appears about the base of the stem that now carries a head of seeds, each adorned with a long curling plumose style. Among the many other names given to this plant Wild Crocus, Windflower and Prairie Smoke are most commonly heard. It is the state flower of South Dakota. It is one of the most striking of all the flowers of the region and always attracts the attention of the visitor from other sections.

THE BITTER-ROOT, WHICH CLINGS TO LIFE

The Bitter-root is a beautiful and interesting flower. Belonging to the Portulaca Family, it clings to life with a tenacity that exceeds even that of its near relative the garden purslane, or "pulsey." The thick fleshy roots have grown after having been kept in a dry room for several years. This tenacity of life has given it the second part of its scientific name, *Lewisia rediviva,* the first part being given in honor of Meriwether Lewis, of the Lewis and Clark Expedition across the continent in 1804. The thick roots are full of starch, and were formerly used for food by the Indians, who collected them in the spring, when the bitter bark is easily removed. When peeled and boiled, the roots then have little of the bitter taste. Growing on open dry hillsides from Montana, Utah and Arizona westward, it blooms in the spring, producing a white or rose-colored flower from one to two inches across, with six or eight delicate petals. The flowers rise but a few inches above the ground from the centre of a rosette of narrow thick leaves. The bitter-root is the state flower of Montana, where it abounds in the Bitter Root Mountains.

THE SULPHUR FLOWER, A RELATIVE OF THE COMMON BUCKWHEAT

Belonging to the Buckwheat Family, the Sulphur Flower *(Eriogonum),* is named for its yellow color. From a stout thick root short stems arise that bear rosettes of paddle-shaped powdery gray leaves. From among these, slender flower-stems stand from six to ten inches high, supporting an umbellate cluster of small simple sulphur-yellow flowers. On gravelly banks of the plains the plant spreads and ascends the mountains till it is far above the timber-line, decreasing in size as it climbs. On the mountain-top the flowers remain of the same size as those on the plain, and the root is very little smaller, but every other structure is reduced and dwarfed, an entire plant being less than two inches high.

THE UMBRELLA PLANT, WHICH DIFFERS IN COLOR

The Umbrella Plant is almost exactly like the sulphur plant, except that the flowers are white or cream, tinged with pink. It, too, ranges from the plain to

GAY MOUNTAIN FLOWERS

The white Mountain Phlox like patches of snow upon the mountainside. This picture was taken in Yellowstone National Park.

A cluster of light blue Lupines on the mountains of the Yellowstone National Park.

Photos, J. W. Cribbs.

An Alpine meadow carpeted with Mountain Daisies, each flower nearly an inch across. This field was seen in the Colorado Rocky Mountains at 11,000 feet.

Photo, George D. Fuller.

the mountain-top, diminishing in size as it climbs higher and higher.

THE FIREWEED, WHICH IS ALSO CALLED WILLOW-HERB

Strange flower, thy purple, making haste
To glorify each blackened waste
Of fire-swept land,
Is with a blessed meaning fraught,
And we—when pain has fully wrought—
Shall understand.

The habit of coming in quickly after forest fires and covering the unsightly waste with handsome flowers has given its name to the Fireweed *(Epilobium)*. The long willowy leaves that screen the charred and blackened trunks with their luxuriance have also given it the name Willow-herb. It is a handsome, showy plant, from three to six feet tall, with stems and branches and petioles shading from white to rose and ending in crimson buds. The flowers are an inch across, with four broad petals, eight stamens, and a long four-lobed style. In color they are reddish lilac, some shading away to almost white. The corolla is at the top of a long ovary which, when mature, forms a slender capsule from two to three inches long, filled with small seeds well tufted with silky down. When ripe, the capsule splits into four long valves, releasing the feathery seeds that float on the breeze for long distances. This wide dispersal of its seeds assures the fireweed of being among the first plants to reach a burned-over area. Through July, August and September the plant blooms on, during the last month filling the air with its silky plumed seeds.

GAILLARDIA, SOMETIMES FOUND IN GARDENS

A close relative of the sunflower, the *Gaillardia* does not seem to have acquired a common name, and yet its splendid flower is to be seen throughout the prairies, the plains, and much of the montane region. Of the Composite Family, its flower-head has a compact disk surrounded by a radiating ring of strap-shaped flowers. The entire bloom is from two to four inches across, the colors usually shading from yellow at the tips of the rays to dark orange passing into purple at the centre. So handsome are the flowers that the *Gaillardia* has found its way into gardens and is cultivated for its beauty. The plants are a foot or two high, with most of the leaves basal, varying in form from lanceolate to deeply pinnatifid. The flowers are on long slender stems that make them easily picked and displayed in vases.

SUNFLOWERS, LARGE AND SMALL, TALL AND SHORT

Scattered over the western plains, Sunflowers *(Helianthus)* reach their climax display. Large and small, tall and short, they turn their yellow faces constantly to the source of light and life.

The Sunflower turns on her god when he sets
The same look which she turned when he rose.

The display of golden disks is not limited to the true sunflowers, but is shared by the Dwarf Sunflower *(Helianthella)* and the Balsam-root *(Balsamorrhiza)*. The latter has a thick root abounding in gum, while the leaves of both form a loose rosette about the leafless stem that bears the flowers.

THE CACTUS FLOWERS, WHICH HAVE INVADED THE NORTH

The Cacti are really most at home in the desert, and are most numerous in the arid parts of the Southwest, but two or three have ventured far to the north and are plentifully scattered over the plains even in Montana and Saskatchewan. They are curious plants in which the leaves are often completely absent and the leaf-work is done by the thick succulent stems. Perhaps the most abundant variety is the small Prickly Pear *(Opuntia)*, with broad flat stems developed in joints that are about an inch across and two or three inches long. These joints, when young, have a few needle-shaped leaves, but they soon drop off. Stout spines are scattered over the stems in great abundance—spines so sharp and strong that they easily pierce through a leather shoe. Water is stored in the stem so that the plant is able to flower in the hot, dry summer.

The flowers are cup-shaped, composed of many bright petals surrounding numerous long stamens. The most abundant prickly pear has bright yellow flowers two inches across, but red and purple varieties may also be found. The fruit is pear-shaped, fleshy and edible, some of the larger ones from Mexico finding their way into the fruit markets.

The prickly balls of the Pincushion, or Ball, Cactus are also found scattered in the short grass of the plains. At times single spiny balls rather larger than an egg are found, and again dozens are

heaped together in a prickly mass. Here the flowers are composed of long lanceolate purple petals. New Mexico and Arizona have each selected a cactus as the state flower.

YUCCA FLOWERS, WHICH CAN ENDURE DROUGHT

In the same dry portions of the plains in which the cactus grows the Yucca forms a rosette of dagger-like leaves, and from the centre of the barricade sends up a great spike of creamy white flowers. The leaves are often more than a foot long, and the stem rises to a height of from two to six feet, with drooping bell-like flowers over an inch long. So sharp are the leaves that the name Spanish Bayonet is quite appropriately applied to the plant.

Six white perianth leaves form the drooping flower, while within are six stamens and a long style. The pollen, which is quite sticky, is carried from the stamens to the stigma at the tip of the long style by a small white insect known as the Pronuba moth. During the evening, when the Yucca flowers are most widely open, the moth gathers a ball of pollen from one flower and flies at once to another. Here she pierces the wall of the ovary and lays an egg. Then, going to the stigma, she forces the pollen-ball between its lobes and her work is completed.

The developing pollen fertilizes the ovules and they develop into seeds. At the same time the egg of the Pronuba hatches, and the tiny worm, or larva, begins to feed on the developing seeds. When full grown, the larva eats its way out of the pod that has now become upright, and drops to the earth. It usually happens that the larva has left untasted enough ripe seeds to pay for the food that it has eaten. Flowers not visited by the Pronuba remain unfertilized and produce no seeds, so the existence of the plant and of the insect depends upon the curious visits and labors of the Pronuba mother moth.

II. THE LUXURIANT FLOWERS OF THE MONTANE ZONE

In the Rocky Mountains the montane zone occupies the slopes of middle elevation and includes all the taller, richer forests. Pine, spruce and fir trees are most plentiful, and their shade is often so dense that only a few shade-loving flowers are able to grow in the deep woods. Many open spaces, however, are found along streams or in the flat-floored valleys where natural mountain parks are developed and where grass land and forest mingle. Here mountain meadows are found in which floral display reaches its climax. On account of the good water supply furnished by the more abundant rains, the plants are taller and are more closely massed than in the plains or the foot-hills. In these mountain parks, several of which are now preserved, are found natural flower gardens affording a display unsurpassed in any country in the world. Here indeed do

> A thousand odors rise,
> Breathed up from blossoms of a thousand dyes.

While the variety is too great, and the number too large, for us to describe them all, some of the most abundant and most beautiful must be mentioned.

MOUNTAIN DAISIES, WHICH CARPET THE MEADOWS

While the daisies of the lowlands sprinkle the meadows with silver and gold, those of the mountains add to the white and yellow colors shades of purple and blue that give even greater beauty to mountain meadows. Varying almost as much in size as in color, the Mountain Daisies *(Erigeron)* are from one to three inches across their heads, and from eight inches to two feet in height. They reach their best development in the open mountain parks at altitudes of between 6,000 and 9,000 feet, but do not stop there. On to the very top they go, and some of the alpine meadows are carpeted thickly with daisies that are only two or three inches high but with flowers an inch across. Other names for these flowers are Daisy Fleabane and Fleabane. One of them, the Black Woolly Fleabane, has the stem covered with purplish black hairs, and fifty or sixty white rays surround the yellow disk.

The daisies reach their climax in the Giant Daisy *(Wyethia)*, so abundant in the Yellowstone National Park and adjacent areas. It comes early in the summer with huge blossoms, four inches across, at the top of almost unbranched stems a foot and a half tall. The yellow disk is surrounded by broad white or cream-colored rays notched at the ends. Their size and habit of growth make Sunflower Daisy an appropriate name.

The Daisy-aster *(Townsendia)* is the smaller plant, with almost as large flow-

ers, and is found on the drier hillsides. The leaves are small; and the stems are unbranched and seldom more than six inches high, but they support flowers three inches in diameter, with yellow disks surrounded by bright blue or purple rays.

MOUNTAIN ASTERS, WHICH BLOOM UNTIL FROST

The Mountain Asters are closely related to the daisies, differing from them chiefly by being produced on more branching plants, by being smaller in size, and by having more highly colored rays. They also come later in the season, beginning in late summer and continuing until frost comes. During the season

> Everywhere the purple asters nod,
> And bend, and wave, and flit.

THE MARIPOSA LILY, ONE OF THE SHOWY MOUNTAIN FLOWERS

The Mariposa Lily *(Calochortus)* is one of the showiest flowers of the mountains. It is found from Canada to Arizona, reaching its best development midway between, and extending its range far to the west. The broad cups, held erect on slender stems, are formed of three broad petals within three narrow green sepals. The plants vary in size but are usually over a foot high, and the flowers are often two inches across. In color, too, there is a wide range. One of the most plentiful and most beautiful has petals white or tinged with lilac and streaked with purple, a distinctly purple band appearing above the yellow base. Its scientific name is *Calochortus Gunnisonii,* the first word meaning "beautiful plant" and the latter being given in honor of Captain Gunnison, who discovered it surveying a route for the Pacific Railway in 1853.

A variety with yellow petals spotted with purple is known as the Sego Lily and is the state flower of Utah. Like its relatives, the Sego Lily is perennial from a bulb, and this bulb is used for food by the Utes and other Indian tribes of Utah.

THE WILD HELIOTROPE IN THE MOUNTAIN MEADOWS

In the moist mountain meadows, along with daisies, lilies and other large flowers, the small white blossoms of the Wild Heliotrope *(Valeriana)* add no small part to the beauty of the landscape. Here the white corollas are funnel-shaped and not more than one-eighth of an inch across, with three projecting stamens and five small pointed lobes often tinged with mauve or yellow. The display is accomplished by grouping the tiny sweet-scented flowers into flat-topped clusters a couple of inches across. The branches from below raise other clusters to surround the central one. The thick juicy stalks are from ten to twenty inches high, and bear large opposite glossy leaves, each with from three to seven lobes.

THE LARKSPUR, WHICH THE FARMER DREADS

The tall Larkspur *(Delphinium)* is one of the most stately flowers of the moist mountain meadows. The spike-like racemes reach a height of from three to five feet, with flowers that are usually "blue as the heavens they gaze at." Some varieties have white or purple flowers, and there are some not more than a foot high. All have the finely dissected palmate leaves so common in the Buttercup Family, to which the larkspurs belong. Both the sepals and petals are colored, and one of the former is extended backward into a long spur that gives its name to the flower. The scientific name *(Delphinium)* means "dolphin," and is given on account of the fancied resemblance of the flower to that creature.

Although so beautiful that many varieties are cultivated in gardens, the larkspur has a bad reputation among farmers and cowboys, for it is very poisonous to sheep and cattle. This property has given the plant such names as Stagger Weed, Poison Weed and Cow Poison.

THE MONKSHOOD, WITH ITS PECULIAR FLOWER

Growing alongside the larkspur, closely related and of similar habit, the blue flowers of the Monkshood *(Aconitum)* have, instead of a spur, a helmet-shaped cap developed from one of its blue sepals. Its resemblance to a monk's cowl gives the common name. Blue and pink varieties are often to be found, all on spikes reaching a height of from two to four feet.

THE MONKEY FLOWERS, THE JESTERS OF THE MOUNTAINS

With their mocking faces the Monkey Flowers *(Mimulus)* are the floral jesters. Closely related to the garden snapdragon, the flowers have a similar structure. Each has a long green calyx tube from which comes a bright-colored tubular corolla that spreads open into two lips, the upper turned backward and the lower spreading into three lobes, forming a fanciful monkey's face.

Two kinds are likely to be found in

TALL AND SHORT FLOWER MEMBERS

A mountain meadow with Mountain Daisies and one flower of Mariposa Lily.

The Northern Bedstraw.
Photo, George D. Fuller.

The Yucca belongs to the Lily Family. This species flourishes in poor soil, even in drifting sand. It is sometimes called Silk-grass.

The Willow-herb, or Fireweed, abounds in forest-clearings. It has showy pink-purple flowers.
Photos, L. W. Brownell.

damp spots. One named for the explorer Lewis *(Mimulus Lewisii)* is a foot or more high, freely branching with opposite lanceolate leaves covered with a viscid pubescence. Its flowers are rose-red or purplish, with tubes a full inch long and a laughing face that shoots out its ripe red lips at the passing traveler.

In similar or in more shaded places, on somewhat smaller plants, are the yellow blossoms of the Yellow Monkey Flower, which shows its kin to its larger relative by the dark red spots on its yellow throat. It grows shorter and shorter as the mountain is climbed, until near the top we may find but one inch-long flower on a plant two inches high.

All these monkey flowers have a peculiar sweet odor which is so strongly developed in one found in Colorado and Wyoming that it has the name Musk Plant and has made its way into gardens and greenhouses.

THE LUPINES, WHICH GROW HIGH ON THE SLOPES

Scattered over the mountain slopes where the open stand of trees allows the sunlight to reach the ground, the Lupines *(Lupinus)* form a showy carpet. The leaves are compound, five to ten narrow leaflets radiating from the tip of the petiole, and are often soft with downy hairs. The pea-shaped flowers, usually bright blue, but sometimes variegated or shaded to white, are thickly clustered into a spike.

Those on the lower parts of the mountains are a foot or more in height, with many branches and spikes, but as they ascend the slopes other shorter varieties come in, until near the tops of the peaks there may be but a single flower-spike in the midst of a low rosette of leaves. These alpine lupines are only two or three inches high, but often of the deepest blue color.

LOCO WEEDS, THE TERRORS OF THE STOCKMEN

In the mountain valleys and down to the plains are many spots covered with the silvery gray-green leaves and clustered flowers of the Loco Weeds. They belong to the Pea Family and all have pea-shaped flowers clustered in a spike, or head. The different varieties vary much in color from white to purple and blue. Their leaves are composed of many leaflets pinnately arranged on long petioles, most of the varieties being soft with silvery hair. Most of them are more properly called Milk Vetches *(Astragalus)* and are not only harmless, but useful in covering the plains and providing forage. A few are poisonous and really deserve the name of Loco, or Crazy, Weeds.

When horses, sheep or cattle eat these loco weeds they act in a crazy, drunken manner, and, what is even more peculiar, they develop an unnatural appetite for the plants, as does the opium-eater for his drug, and wish to eat nothing else. The result is sickness and death. The worst offender is the Purple Loco, or Woolly Loco *(Astragalus)*, a low plant with silky white leaves and purple flowers. It is found from Texas to Canada. The White Loco *(Aragallus)* is almost as widely distributed, and while its flowers are usually white on the plains, they become pink, violet and purple in the mountains. It may require an expert to tell the poisonous loco from the harmless, but all may enjoy the attractive flowers of both.

LITTLE RED ELEPHANT AND THE BETONYS

In the higher mountain bogs and in the marshy land along streams grows a slender plant with narrow fern-like leaves, whose dark red tubular flowers are strongly two-lipped. The upper lip ends in an upturned tube so long that it resembles an elephant's trunk. Fancy may also see in the flower a miniature of the flat forehead and flapping ears of the great animal as well as his curved trunk, and hence the name Little Red Elephant. The scientists, too, have seen the elephant's trunk, for they have called the plant *Elephantella grœnlandica*, the latter word indicating that it is also a flower of Greenland and the Far North.

With similar fern-like leaves the flowers of the Betonys *(Pedicularis)* are quite as two-lipped as those of the little red elephant, to which they are closely related. They lack the curved trunk, however, and are frequently known as the Louseworts. Yellow and white ones go up into the open woods of the subalpine regions, some of them forming fine large plants.

III. FLOWERS OF THE SUBALPINE AND ALPINE ZONES

The subalpine zone begins where the forests of the mountain are composed of trees that are decidedly lower in stature than those of the middle elevations. At

first the forests, although low, are thick and dense, but they gradually become more open and interrupted by areas of scrub and grass land. The trees become deformed, bent and twisted by the wind, and at the upper edge of the zone upright trees cease entirely. Thus begins the alpine zone, which continues to the top, or until it encounters a cap of perpetual snow and ice. Spruce, fir and pine trees grow in the alpine zone, but with prostrate trunks and low matted branches. There are also stretches covered with shrubs, among which willows and heaths are abundant. Most extensive of all the alpine associations are the alpine meadows, in which dwarf plants of an infinite variety are rich with flowers of a hundred hues. These often take the form of mats, or cushions, with short stems, small leaves, rather large roots, but with flowers of large size and brilliant colors.

In the alpine zone spring, summer and autumn are compressed into the few warm weeks of midsummer. Very few spring plants are in bloom before June, and the autumn flowers are passing before the end of August. The same shortening of the season is found to lesser extent among the subalpine flowers.

THE COLUMBINES, WHICH HAVE A WIDE RANGE

The graceful columbine, all blushing red,
Bends to the earth her crown
Of honey-laden bells.

The Red Columbine *(Aquilegia)* is not confined to the mountains, but is scattered over hillsides far to the east and north. From a cluster of divided leaves it sends up light, airy stems a foot or two high, branching and bearing large drooping flowers and buds that open in succession. The flowers consist of five red sepals and five red petals. The former expand like petals, and the latter are extended backward into long hollow spurs terminating in knobs filled with honey. The flowers are usually scarlet, with the edges of the petals golden yellow. From the centre of the flower the numerous stamens and the five slender styles hang as a golden tassel. So handsome is this columbine that it finds a place in many gardens.

Even more beautiful is the Blue Columbine, which reaches its perfection in the subalpine parts of the Colorado mountains and has been most happily chosen as the state flower of Colorado. Larger than the red, its flowers are two inches across and of less drooping habit. The spurs are long and straight, but still rich in nectar. In color it ranges from deep blue to nearly white, the lighter shades being more plentiful as it finds sheltered nooks among the alpine rocks.

Nor does this exhaust the list of these showy flowers, for the mountain-climber will occasionally find a small blue one near the top of the peaks, and many large yellow ones grow on the slopes below.

THE FORGET-ME-NOTS, SOME ONLY AN INCH HIGH

Widely scattered through the mountains and fringing streams are found the tiny blue yellow-centred disks of the Forget-me-nots. The flowers are arranged in loose one-sided spikes and are equally attractive whether they belong to the false or true varieties. The False Forget-me-not *(Lappula)* has rather larger flowers. Its rotate corolla is a quarter of an inch across, and its fruit is made of four little nutlets armed with barbed prickles. These tiny burs also give the plant the name of Sticktights, but the beauty of the flowers should attract more attention than the prickles of the fruit.

The true Forget-me-not (*Myostis alpina)* has no burs, and the tiny flowers are quite fragrant. The plant is seldom more than six inches high. Many romantic legends are connected with these emblems of friendship and affection, a most charming one running:

When to the flowers so beautiful
The Father gave a name,
There came a little blue-eyed one
(All timidly it came),
And standing at the Father's feet,
And gazing in his face,
It said, in low and trembling tones,
Yet with a gentle grace:
"Dear Lord, the name Thou gavest me,
Alas! I have forgot."
Kindly the Father looked him down
And said: "Forget me not."

Another still smaller and even more beautiful forget-me-not *(Eritrichium)* may be found by those who climb to the top of the highest mountains. This dwarf beauty is scarcely an inch high; its little leaves are covered with soft white hairs; and its tiny flowers are of the clearest sky-blue. It is one of the rewards for mountain-climbing.

DROOPING FORGET-ME-NOT, OR BLUEBELL

Another beautiful blue flower belonging to the same Borage Family has the flowers

with a tube-like corolla that makes the name Bluebell seem even more appropriate. Two or three species of this flower *(Mertensia)* droop over the mountain streams—the alpine form not more than six inches high—while lower down the slopes and species two or three feet high, very similar to their Eastern cousins known as lungworts, or Virginia cowslips. The buds are bright pink, but as they open they turn gradually to deep blue.

THE HAREBELL, FOUND IN POETRY AND SONG

This delicate flower, the true Bluebell of Scotland, sung by poets of every age, is found abundantly on the western mountains and on the eastern hills of America. An extremely hardy plant, the Harebell *(Campanula rotundifolia)* is found perched on precipitous rocks, anchored in the crevices of cliffs, or growing on the gravelly slopes of the alpine meadows, where its delicate bells swing and bend, but never break, before the sweeping winds.

Its name *rotundifolia* refers to the round basal leaves of the plant which wither early, while the narrow pointed stem leaves are present when the flowers appear. Near the foot of the mountain it is more than a foot tall, but in the alpine zone it is dwarfed to a fourth of that height. The erect buds droop on their slender stalks as they open into bells of the purest dark blue. The bell-shaped corolla, with its five lobes, retains its full size on the highest mountains, being always more than a half inch long.

PAINTED CUPS, ALSO FOUND IN THE EAST

> Flowers that with one scarlet gleam
> Cover a hundred leagues, and seem
> To set the hills on fire.

No grander sight may be seen by travelers along the tree-line of the mountains than the wonderful slopes carpeted with the yellow, scarlet, crimson and purple masses of the Painted Cups. Red Indian Paint Brushes they are sometimes called, since the massive spikes resemble brushes dipped in red paint. The plant owes its brilliancy of color, not to the flowers themselves, but to the prolonged and red-tipped bracts, or reduced leaves, which stand one below each flower and almost hide it from view. Even the calyx is commonly more brilliantly red than the slender two-lipped corolla tube that often is merely a tint of greenish yellow tinged with red. It scarcely projects beyond the bracts, but bracts and flowers together form a dense spike. In height the plants vary from six inches to two feet, the best display being usually made by the shorter plants.

While it reaches its best development just below the alpine region of the mountains, the painted cup descends to the plains and goes far to the east, where the poet Bryant describes them as

> Scarlet tufts
> All glowing in the green like lakes of fire;
> The wanderers of the prairie know them well,
> And call the brilliant flower the painted cup.

PHLOX, ON THE DRY ROCKY SLOPES

On dry rocky slopes of the mountains snow-white patches appear in the late spring that on closer examination prove to be low mats of Phlox entirely covered with white flowers. The corolla is salver-formed, with a five-lobed border, and five stamens are within its tube, while at times the white is tongued with pink or purple. The leaves are needle-like, clustered about the stems so that they loosely overlap.

Although the Alpine Phlox descends to the plains and mingles with the short grass, it still retains its dwarf, matted, alpine habit. The Prairie Phlox, however, grows a foot tall, and brings its flat-topped clusters of reddish purple flowers high up among the grasses.

THE ARNICAS, THE SUNFLOWERS OF THE MOUNTAINS

During July and August the Arnicas are the most conspicuous yellow flowers of the higher mountain regions. They take the place held by the sunflowers on the plains, and it would not be far wrong to call them Alpine Sunflowers. Belonging to the Composite Family, both the disk and ray flowers are bright yellow, two or three inches across, and are supported on stems about a foot high. These stems are seldom branched, but carry three or four pairs of somewhat arrow-shaped leaves.

Several varieties are easily distinguished. The Heart-leaved Arnica grows abundantly in the rather open woods of the subalpine, while the more slender and graceful Alpine Arnica is nearer the top of the high peaks. In the latter there are from ten to twelve golden ray flowers about the yellow disk, each ray being double-notched at the apex. The seeds are furnished with a pappus of tufted

bristly hairs that float them in the mountain breezes.

THE ALPINE PINK, COMMON ON MANY MOUNTAINS

> There, cleaving the ground, it lies
> With multitude of purple eyes
> Spangling a cushion green like moss.

Where the last line of vegetation grows, prostrate upon the earth, the Alpine Pink *(Silene acaulis)* displays its cushions. From a large tap-root slender branching stems form dense tufts from one to three inches high and from three to eighteen inches in diameter. Narrow linear leaves crowd the stems, forming a green cushion over which are thickly scattered starry flowers with five purplish pink petals. The flowers are solitary at the tops of the branches, and less than a half inch across, but are often so numerous that their petals almost touch one another. These flower-sprinkled cushions are often within a stone's throw of a snow-bank that lingers on the mountainsides.

No alpine flower is more widely spread, for it is freely scattered over the Rocky Mountains, is found on the summits of the White Mountains of New Hampshire, in Labrador and in Alaska, and also on the mountains of Europe and Asia. Some other names under which it is known are Moss Pink and Moss Campion.

WOOD NYMPHS, FOUND IN THREE CONTINENTS

The name is here a little misleading because the Wood Nymphs grow in the alpine regions high above the forests. The scientific name *Dryas octopetala* means "wood nymph with eight petals," and its creamy white flowers do usually have eight petals. The stems are prostrate and woody, with small thick oblong green leaves covered on the under-side with thick white hair. The flowers are like great creamy white buttercups, an inch across, held erect on stems two or three inches high. Numerous stamens and carpels occupy the centre of the flower, the latter ripening into seed-like fruits, with plumose styles an inch long attached. This fruit gives the name of White Mountain Avens by which many know it. In the Rocky Mountains from Colorado to British Columbia it goes north and from there east to Labrador and Greenland, whence it crosses the ocean to the Arctic and alpine regions of Europe and Asia.

NORTHERN BEDSTRAW, WHICH ALSO WANDERS FAR

Many flowers that are inconspicuous in the lowlands at once attract attention in the mountains since they are represented by more attractive species. This seems strikingly true in the case of the Northern Bedstraw *(Galium boreale)*, a plant often quite appropriately called Mountain Bedstraw. Belonging to the Madder Family, bedstraws are low plants with slender, often prickly stems on which narrow leaves are arranged in whorls of four (sometimes of six) and which bear small four-petaled white flowers. These flowers are so minute that they are usually inconspicuous, but in the northern bedstraw they are produced by the hundred on stems from eight to twelve inches high, forming a cloud of tiny white stars. The effect is not unlike frills of white lace over green silk, the leaves of the plant and its neighbors making the green background. The mountain-climber is sure to find the delicate flower along his trail even when he goes far afield. In Alaska and in Labrador the same white flower grows at low elevations, and it is also found in the mountains of Europe and Asia.

THE NEXT STORY OF PLANT LIFE IS ON PAGE 6927.

Photo, L. W. Brownell.

Over the plains grow hosts of Sunflowers, large and small, tall and short.

TYPES OF EASTERN PEOPLES

A city Arab in Palestine.

A Samaritan high priest.

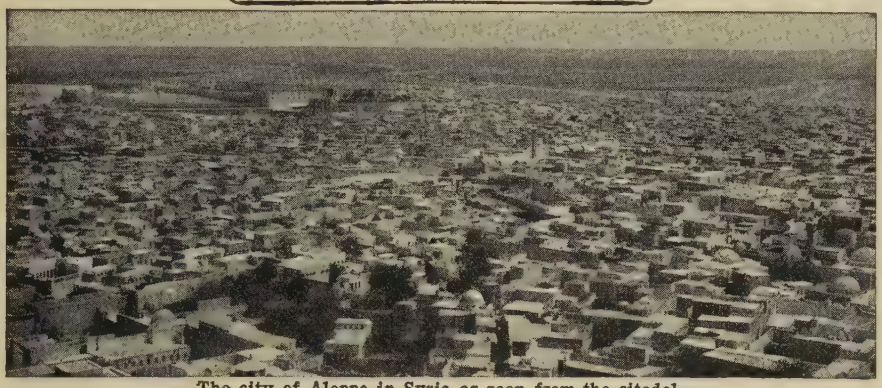
A little water-carrier.

A school for small boys in the coast village of Loheiya in Arabia.

A boat on the Tigris.

Bedouin sheik of Syria.

Jewish types, Jerusalem.



The city of Aleppo in Syria as seen from the citadel.

ARAB-ASIA

MESOPOTAMIA, ARABIA, PALESTINE, SYRIA

CONTINUED FROM 6592

MESOPOTAMIA is a new nation. It obtained its independence through the World War, and was established as an independent state under the guidance of Great Britain by the terms of a mandate from the League of Nations. A large majority of its people are Arabs, who before the war had long been under the rule of the Turks. The land is one of the most famous in ancient history. It was once the seat of the most powerful nation in the world.

Mesopotamia, which the inhabitants now call Iraq, but which most of us will still call by its ancient and historic Bible name, means "the land between the rivers." Those rivers are the Euphrates and the Tigris, both rising in the Turkish province of Erzeroum. After a widely wandering course by the Euphrates, and a more direct and rapid course by the Tigris, they meet in the southern part of the great Mesopotamian Plain, about seventy miles from the Persian Gulf. The length of the Euphrates is 1,800 miles, and the length of the Tigris about 1,150 miles.

These rivers, used properly for irrigation, are capable of fertilizing the plain and supporting a large population. In the distant past the country was fertile and prosperous, and contained great and wealthy cities. But until within the memory of people still living the very sites of these cities had disappeared. The old systems of irrigation have fallen into decay and disuse, and in 1920 the people of this country, seven times as large as Nova Scotia, numbered only 2,850,000.

One of the chief ambitions of Germany, when she began the war, was to use Turkey as an entrance to the Mesopotamian Plain and so to reach the waters of the East by rail to Koweit on the Persian Gulf. For these reasons she induced the Turks to join in the war on her side. But the British armies, with powerful support from India, forced their way up to Bagdad, the capital of the country, on the Tigris. There they were received as deliverers by the Arabs.

The Turks had never been more than a small minority of the inhabitants. So the object of the British was to establish a firm, independent, popular Arab Government. In August, 1921, Feisal, son of the king of the Hedjaz, was elected king, and British support was continued. The Turks had advanced a claim to reoccupy Mosul, on the upper part of the Tigris, opposite the site of Nineveh, an im-

portant city with 90,000 people, a centre for several trade routes. In December, 1924, the League of Nations took up the question. The Mosul district has rich supplies of oil.

Bagdad was in the days of the Caliph Harun-al-Rashid the most famous city of the East. It is still regarded as the home of Eastern romance. Basra is the seaport at the head of the Persian Gulf. Trade has revived considerably since Bagdad came into touch with the business energy of the West. There is a regular air service from Cairo, as well as a motor service from Damascus.

OLD WORLD HISTORY REVEALED IN A LANGUAGE OF 6,000 YEARS AGO

The early history of Mesopotamia that comes to us in the form of writing takes us back six thousand years. Only Egypt has as early a record. The Sumerians and Akkadians, a people probably of Mongol origin, occupied the plain and brought it into a state of fertility. Their language, which had a resemblance to Chinese, has reached us through their conquerors, a Semitic race somewhat like the Arabs and the Jews. These conquerors mixed with the Sumerians, and the united races formed the powerful country which had as its capital Babylon, on the Euphrates.

The Sumerians wrote by pictures, but these were shortened into a cuneiform, or wedge-shaped, writing. We can find examples in our museums on baked clay tablets which look like cakes of soap. The writing looks as if tin tacks had been pressed into soft clay tablets and the marks made had been baked in. But these wedge-shaped signs and arrow-heads make up an alphabet in which histories, legends, laws, records and business arrangements are written. The writing was pressed into wet clay tablets or cylinders by a stylus, or blunt pen. When the tablets were baked they remained unchanged for thousands of years in the dry climate of the East, buried under the sand amid the ruins of ancient cities that have crumbled into shapeless mounds.

THE MAN WHO STOOD ON A PRECIPICE TO COPY AN INSCRIPTION

Now that they can be read we can learn more about the people of ancient Babylonia than our forefathers ever imagined.

This cuneiform writing was at last made out in much the same manner as Egyptian writing was read, through finding the same thing in three languages, as you read on page 3548. Sir Henry Rawlinson, traveling in Persia, saw on a high rock at Behistun an inscription in three languages. The rock was so high that he could not reach it by ladders from below, but he had himself slung down from above. Then with great difficulty he obtained a "squeeze" of the inscription—that is, he pressed damp paper against the letters so that they appeared raised on the paper. This he brought away for study by men who knew the other two languages, and from them they gradually learned how to read the third unknown language. This language was not only written by the Babylonians, but by other nations around, such as the Assyrians, and the Hittites in Asia Minor.

The Assyrians were a very warlike people living in the hills to the north of the Babylonian plain which we now call Mesopotamia. Presently they descended into the plains and conquered the Babylonians. The cuneiform writing spread far and wide over the East and even reached Egypt, though not for general use. One of the Egyptian kings, at a time when Egypt was a conquering power, extended his rule far into Asia, and married a lady whose people used the cuneiform writing. Her son set up a new temple on the banks of the Nile in honor of his mother's god, which represented the sun. Centuries afterward an inscription in the arrow-head writing was discovered in Egypt in what are called the Tel-el-Amarna tablets, so named from the place where they were found.

LIGHT THROWN ON THE MANNERS AND CUSTOMS OF PEOPLE IN THE PAST

For some centuries Assyria, with its capital at Nineveh on the river Tigris, was the leading power in Western Asia. Some of the most famous statues and sculptures in the British Museum were dug out of the ruins of Nineveh, in the nineteenth century, by Sir Henry Layard and other excavators. All these discoveries increased our knowledge of the language and the life of the nations which inhabited Mesopotamia in the far-off past.

In this way we know of the doings of the great kings of the East who were conquerors and lived in magnificent style. Some were wise lawgivers. Some were lovers of learning and these had libraries

IN THE LAND OF TWO RIVERS

A quaint native raft on the Tigris.

A quiet scene near Basra.

The great city of Bagdad on the river Tigris.

The Shat-el-Arab near Basra.

The mosque at Kazimain.

A street scene in Hillah.

An Arab boat on the Tigris.

The river Tigris near Bagdad.

written on clay tablets which preserved earlier history, besides telling of the glories of their own conquests. One of the wisest of these kings was Hammurabi of Babylon, more than two thousand years before Christ. He drew up a code of laws about the time when Abraham's father was leaving Ur of the Chaldees in Mesopotamia and moving with his flocks and herds into southern Syria, on his way to Palestine, where the Jewish race began.

Some of the laws adopted by the Israelites when Moses organized them into a separate nation, are found on the stone pillars which Hammurabi set up in different parts of his dominions, that people might read for themselves the laws which they had to obey. A cast of one of Hammurabi's pillars may be seen in the British Museum. Hammurabi's laws, the oldest known, are for the most part wise and practical. They show the Babylonians to have been an industrious and civilized people.

Sennacherib, the Assyrian king mentioned in the Bible as failing to take Jerusalem from King Hezekiah because his army was destroyed by pestilence, was a son of a great king Sargon. He had an even more famous grandson, Ashur-bani-pal, who founded one of the most famous libraries in the world. This king sought for copies of the old Babylonian books in the libraries and temples of the ancient cities, and had them copied, translated, arranged and catalogued. He also had additional annals written. This is how he described this part of his life's work:

> I have written upon tablets the noble products of the Scribes which none of the Kings which have gone before me had learned. I have arranged them in classes, revised them, and placed them in my palace that I, even I, the ruler who knoweth the light of Ashur, the king of the gods, may read them.

From this library we have accounts of the creation of the world and of the Flood resembling the accounts given in the book of Genesis. There are also in it stories and fairy tales, hymns and prayers, and letters of business.

Soon after the time of Ashur-bani-pal the Medes from northern Persia, helped by a treacherous Assyrian general, besieged and destroyed Nineveh. The Assyrian general, Nabopolassar, took Babylonia—that is, western and southern Mesopotamia—as his share of the spoil and started a new Babylonian empire. It was his son Nebuchadnezzar who took Jerusalem, blinded the Jewish king, and carried his people away captive into Babylon, just as the Assyrians had carried away the northern Israelites one hundred and thirty-seven years before. Nebuchadnezzar made Babylon a most magnificent city. Nabonidus, who came after Nebuchadnezzar, was a zealous collector of old things was a historian. During the reign of his son, the Belshazzar of the Bible, Babylon surrendered to Cyrus, the Persian conqueror who allowed the captive Jews to return to Palestine. Both those who returned and those who stayed in Babylon learned much from Babylonian knowledge. The Jews thus became a bookish people, and they went home to Jerusalem to write their own history.

After the Babylonian rule was destroyed by Persia, came the Greek conquest. This was followed by the Roman, but Rome never reached the people of the Near East with as personal an appeal as Greece had had through her language. Then Asia, from the Black Sea to the borders of India, and afterward beyond those borders, was swept by Mohammedanism and the sword. First it was Arab conquest, which centred itself on Bagdad about the time when Charlemagne, in the same spirit, was defending Christianity in the West. And then came the Turks.

Thus we see that the Mesopotamian Plain has played continuously a notable part in the great movements of nations. In it lived the most aggressive nations of antiquity for three thousand years before Christ. The country revived under Arab Mohammedan rule, but sank back into stagnation under Turkish indolence. Once more, under the rule of Feisal, the Arab appears to be coming into his own.

ARABIA AND ITS PEOPLE

THE Arab race is to-day feeling a greater sense of unity than it ever has before. The Kingdom of Iraq has been set up on the Mesopotamian Plain. In Transjordania, which you know means "beyond Jordan," there is Arab rule

SWEET ARABY THE BLEST

Entrance to the harbor at Muscat.

Town of Es Salt in Transjordania.

Mohammedan pilgrims praying round the Kaaba, the sacred shrine at Mecca.

The hill of the Acropolis at Petra.

The roofs and minarets of Medina.

Photos, The American Colony, Jerusalem; the E.N.A.; Donald McLeish and others.

under a League of Nations arrangement called a mandate, with an Arab Emir. In Palestine the Arabs are clamoring for a fuller share in government. On the west coast of Arabia there is now the independent Arab kingdom of the Hedjaz, which contains the chief Holy Cities of the Mohammedan faith.

There are many other Arab tribes widely scattered along the north of Africa and in Arabia. Whether the movement for unity and independence is likely to spread in these regions, we cannot tell. Let us look at the vast homeland of the race—Arabia.

The Arabian peninsula, whence the race has spread as far as the borders of Persia and Turkey, and over considerable areas of Africa, has an extent of more than a million square miles. That is, it is twenty times as large as Arkansas. Its population does not exceed five millions. Though nearly all of the Arabs in Asia outside of Arabia are concerned in the movement for Arab self-government, not one-fifth of the Arabs in Arabia have shared in it.

The reason is plain. They have no need for action as a race. They are separate tribes, each living in its own part of a wide land that bars them from each other by deserts or mountains. When Turkish rule disappeared, they had no reason to fear any loss of liberty at the hands of foreigners. They are grouped under their own sheiks, who, where a number of tribes make up a kind of provincial unity, pay tribute to the most powerful sheik in the group. He calls himself an Imam, or an Emir, or a Sultan, or a King. In this way Arabia has more than a dozen loosely put together states, within not very clearly marked desert boundaries. Politics means to these states their relations with neighboring Arab states living beyond intervening deserts.

THE BOND OF KINSHIP BETWEEN THE NATIVE PEOPLES OF NORTHERN ARABIA

As two-thirds of the Emir-governed states are round the coast, and Arabian trade is largely in British hands, the British have friendly relations with the most important Arab rulers. These they support with yearly payments of varying amounts. Thus British influence is felt throughout a great part of Arabia, though it is not a controlling influence. The Arabs feel most strongly the bond of racial kinship round the north of the peninsula. There they abut on other nations, as on the French in Syria, the Turks on the Mesopotamian border, and, on the east, the Persians. It is here that they feel strongly as a race. It is here that they are now governed under King Hussein in the Hedjaz, under his son King Feisal in Mesopotamia, and Emir Abdullah, another son of Hussein, in Transjordania.

The Arabian peninsula is skirted along the whole eastern shore of the Red Sea by a range of mountains lying back about a day's journey from the coast. The coast runs northeast and north to the state of Oman, where the mountains again reach a height of ten thousand feet. But when the coast of the Persian Gulf is reached the shore becomes low and marshy.

THE CARAVAN AND PILGRIM ROUTES THAT CROSS THE DESERT WAYS

Thus western and southern Arabia are ringed round by mountains. These have their steep side toward the sea, but on the inward side fall only two thousand feet or less, and merge into a lofty plateau that sinks gradually to the north. The habitable part of Arabia is its mountain region, for a varying distance up to 150 miles inland.

The whole inland southern part of the plateau is soft, sandy, waterless desert, uninhabitable even by Bedouin tribes. In the spring, however, verdure appears, and for short periods herds may graze the fringe of "the empty land," as it is called.

But in the middle of Arabia, where there are watercourses, dry except during the infrequent rains, with oases here and there, and wells at long distances, there are a number of caravan routes. These are used for trade and for pilgrimages between the Hedjaz and the northern part of the Persian Gulf. Here formerly was the central Arabian empire of the Wahhabis, founded by Mohammed Abdul Wahhab, a Mohammedan reformer. Wahhab's idea was that the Arabs should return to the purity of the Mohammedan faith as it was in Mohammed's day. But the people became intolerant and cruel, and travel in that region became impossible for those who were not Mohammedans. Now the states of Nejd, in the middle of Arabia, and Hasa, on the Persian Gulf, are under one Emir, and form the next most powerful government in Arabia to the Hedjaz in the west and Oman in the east.

THE FAMOUS CITIES THAT LIE BURIED IN THE SANDS

Farther to the north is the Bedouin state of Jebel Shammar, and north of this is the great desert of Nefud—the Red Desert. Beyond the little town of Jauf this merges into the great stony desert of Syria, separating Damascus from the plain of Mesopotamia. These northern deserts are thinly occupied, in their less inhospitable parts, by wandering Bedouin tribes. Travel over the interior routes of Arabia depends on the camel. This not only is the means of transport but often by its milk provides drink for both men and the horses, which the wealthier Arabs use chiefly to add to their dignity. Next to the camel the ass is the chief beast of burden.

This is the country, edged round by mountains except on the north, and filled in its lofty centre with deserts, where Mohammedanism was born. It is now believed by two hundred millions of mankind. There is no doubt it was much more prosperous in the distant past than it is now. Just as on the Syrian plain in the north—now desert—there were great cities, like Palmyra, so in southern Arabia there are signs of vanished greatness. Arabia is drying up more and more. The sands of the great southern desert creep steadily forward. Under them are buried cities once flourishing and famous. Some day, when the Arabs of the interior are less suspicious and unfriendly, men will dig the Arabian sands and possibly find historical records of which we now know nothing.

THE SHELTERED VALLEYS AND OASES WHERE THE DATE-PALMS GROW

In southwestern Arabia was the favored land of the Queen of Sheba, whose gold adorned the Temple of Solomon. The country around, what we now call Yemen, once was the fabled "Araby the Blest," or Arabia Felix, happy Arabia. Yes, Arabia has gone backward. And yet in its choicer parts it is not unblessed. Wherever there is water there is fertility. On its low-lying coasts it is perhaps the hottest part of the world. But if we follow up the valleys that cleave its lofty coastal ranges, not far from the parched seaport of Aden, we shall find, as we ascend to the cooler heights, that there are mountain springs whose bubbling waters are treasured as if they were nectar. The mountainsides are terraced to preserve the soil. There grow all the most delicious fruits, the trees that yield the once-famed spices of Arabia, and coffee plants that give such coffee as no other place in the world can produce. In the sheltered valleys and oases the date-palm flourishes, and the sustaining date becomes the staple food of both man and beast. But such places are few, and over the land is a general feeling of decline and a shrinkage of the fertility that it once enjoyed. Arabia has little now that it can sell to the world that it may purchase the things it most sorely needs. Dates, hides, wool, gum, coffee, horses, and, from the Persian Gulf side, pearls are almost the only products it can offer.

The Hedjaz is the most important part of Arabia historically, because it is the region where Mohammed lived and attained an influence that has been felt throughout the East ever since. It has also been the source of Arabia's modern revival.

THE RAILWAY THAT LINKS THE OLD CITIES OF DAMASCUS AND MEDINA

In 1916 Hussein Ibn Ali, the Shereef of Mecca, proclaimed his independence of Turkey. Beyond the Jordan he and his sons formed the right wing of General Allenby's advance on Jerusalem and Damascus. After the war Hussein's kingship of the Hedjaz was acknowledged by the powers. Later, when the Turkish Sultan was forced to give up the "caliphate," or leadership of the Mohammedan world, it fell to Hussein. His influence is now immense.

The railway from Damascus to Medina was used by Turkey to garrison the Holy Cities of the Mohammedans. It runs through Transjordania, part of the mandated territory of Palestine, and a province of the Hedjaz. In this province are the towns of Akaba and Maan, now added to Transjordania. Then it continues past El Akhdar and El Ala to Medina, but it has not yet reached Mecca.

The population of the Hedjaz is about 900,000. The capital is Mecca, the supreme goal of Mohammedan pilgrimage. Jiddah, the port of Mecca, is two days' journey distant from it. Yambu is the port for Medina, which is Mohammed's burial place and second only to Mecca in holiness in the Moslem world.

The highland province of Asir, south of the Hedjaz, has now been extended

to the port of Hodeida. Its capital is the small inland town of Sabiyah. Asir has a population of about a million.

THE COUNTRIES THAT CAN BE REACHED ONLY BY DESERT WAYS

Yemen, the most fertile province in Arabia, has, by local war, been reduced in size. It is extremely mountainous. Its population is estimated at a million. The capital is Sanaa, beyond the central mountain range. Mocha, the port once famous for its export of the coffee of the province, has declined, as the trade now finds its outlet through Aden.

Aden is a strong fortress, port of call, and trading centre for southern Arabia and East Africa. It is administered from Bombay as an Indian outpost and has been occupied by the British since 1839. Its protectorate extends eastward through the Hadramaut district to Oman.

Oman has Muscat as its capital. It is an independent state under a sultan who has an income from Britain. The population is about half a million. The trade is chiefly with India. Dates are the chief product. Camel-breeding is especially important inland.

The Bahrein Islands, in the Persian Gulf, off the Arabian coast, governed by an Emir, form a protectorate under the Indian Government. The population is about 110,000. Bahrein, the largest, is a centre for a valuable pearl fishery. It is also a busy trade depot, nearly the whole import trade of central Arabia passing through it to the interior.

The central Arabian Emirate of Nejd and Hasa has a population of about 400,000. Riyadh is the capital of Nejd, and El Katif, on Bahrein Bay, in Hasa, is the chief port.

The state of Jebel Shammar, north of Nejd, has a population of 250,000. Hail is its capital.

The port of Koweit, on the Persian Gulf, near the frontier of Mesopotamia, is governed by a sultan under British influence. According to the original plan of the Bagdad railway, it will be its terminus when it reaches the Eastern seas. It is well situated as an inlet for Arabian trade.

It will be seen that Arabia is a land of scattered states. These are mostly all on the coast. They have little unity. Behind them are a few inland states little known and to be reached only by desert routes. But the Arab is naturally a traveler, and he shows it not only on land but by primitive seafaring, for his sailing boats venture far down the African coasts, and even as far as the East Indies. Like the early navigators of Western Europe, these Arab seamen are daring and resourceful.

PALESTINE AS IT IS TO-DAY

ONE of the strangest developments of the World War in its later stages was the important part played by the Holy Land. General Allenby, greatly aided by Hussein, his sons and Arab forces, there finally broke down the Turkish resistance. From then the allies of Germany fell away from her one by one.

As part of the peace settlement it was resolved by the Allied powers that the world should take Palestine under its guardianship and establish it as a self-governing state. Accordingly a mandate was given to Great Britain with a view to the Holy Land being regarded as "a national home for the Jewish people, without prejudice to the civil and religious rights of existing non-Jewish communities."

A scheme of government was accordingly drawn up. It was hoped that the large Arab population, and the considerable Jewish and Christian populations, would unite in working out a system of self-government just and tolerant to all. Sir Herbert Samuel was appointed high commissioner, and for the wise government of the country Great Britain became responsible, under the League of Nations.

The population of the territory in 1922 was 757,182. Of this number 590,890 were Moslems, 83,794 Jews, and 73,024 Christians. Arrangements were made to elect a legislative council, and meantime an advisory council was formed to assist the high commissioner.

The country has been peaceful. The value of its trade increased forty per cent in three years. Improvements were introduced in railways, sanitation, education and other public services. Mohammedan opinion, however, remained suspicious of Jewish influence. Designs and plans for securing national unity in popular government went but slowly.

PALESTINE, LAND OF ANCIENT STORY

Bethlehem, the birthplace of Jesus.

Tower of the Forty Martyrs.

A street scene, Tiberias.

Passing through Wady Hebran.

A Bedouin horseman at the Jordan.

The ancient fortress of Masada.

Palestine as it is to-day does not include the whole of either the Old Testament countries of Israel and Judah or the New Testament area. A small part of northern Galilee, and of the northern country beyond the Jordan, has been included in the French mandatory territories of Syria and Lebanon. But there has been an addition in the south, where Gaza becomes the centre of a Palestinian district.

The area is about 9,000 square miles. There are eighty Jewish colonies in different parts of the country, in which 18,000 Jews are settled. The settlers have shown great energy in making the most of the land given to them. They have rid large tracts of stones, started irrigation, and planted trees. The Arab villages number about 750 in all.

The country is arranged in four districts from north to south. First comes Galilee, with the port of Haifa as its chief town. Then there are Samaria, whose chief town is Nablus; Judea, with Jerusalem; and the southern district, Gaza. Jerusalem, of course, is the capital, and the centre of government for the whole country.

The products of Palestine for export are oranges, melons, wheat, barley, almonds, wine and olive oil. Soap is manufactured for export, and tobacco is grown. Goats, sheep and camels are the most numerous animals. There are 660 miles of railway open for traffic.

Palestine is a land of rock and wilderness in parts. Its one considerable river, the Jordan, runs through such a deeply cut valley that it is useless for irrigation. Yet the country in many districts is capable of cultivation to a high standard of fruitfulness. It might perhaps sustain a population of two millions. More cannot be expected, however scientifically the land's resources are developed. It could never, therefore, be a national home for more than a fraction of the Jewish people, who now number twelve millions.

The truth respecting the Jews and Palestine is that while their genius and the intensity of their religion have associated them forever with the country they once ruled, their possession of it was brief in comparison with the length of their history. Their forefathers must have entered the land about three thousand years ago, but their tenure of it as their own, in independence, did not last five hundred years. Nor were they associated with it in any way except memory for more than a thousand years. It was not till the reign of David that Jerusalem was taken, and in less than five hundred years the greater part of his race was in exile.

Yet the literature they wrote while there, the books of the Bible, have so deeply impressed the world that we think most of that part of the history of Palestine. At the same time we must not forget that the Arabs overran the country in the eighth century, and have therefore an equal claim to its ownership. To-day in Palestine, Arabs are more numerous than Jews or Christians. They claim at least equal rights with the Jews.

SYRIA UNDER THE LEAGUE OF NATIONS

WHEN the World War closed, the French felt they had a right to some mandated territory from the Turkish Empire. They wanted especially the Lebanon region, where they had long had "interests." It was agreed among the powers that they should have the province of Cilicia and the Lebanon district. The Emir Feisal, who had taken part in the war against the Turks, was to rule in Syria proper, with Damascus as his capital, under a mandate controlled by the French.

The Arabs of Syria, however, wanted independence. At a Congress held in Damascus they proclaimed the country as self-governing. Thereupon the French advanced into the country and seized Damascus. Emir Feisal withdrew. Since then France has handed Cilicia back to Turkey. She is now governing Syria and the district of Lebanon under a mandate from the League of Nations.

The capital from which both these states are governed is Beirut. Damascus is the most important and interesting city, and the natural capital of the country. Other large towns are: Aleppo; Homs, the port of Tripoli; the ancient city of Antioch, so closely associated with the early spread of Christianity; and Latakia, which produces a special tobacco, largely used for blending purposes.

Syria has a population of three millions, and the Lebanon district 630,000.

THE NEXT STORY OF ALL COUNTRIES IS ON PAGE 6735.

The Capitol of the United States at Washington, D. C.

ARCHITECTURE IN THE UNITED STATES

CONTINUED FROM 6502

THE architecture of the United States begins with such importations from parent lands as were made by the first pioneers. From Mexico came the very simplified Spanish Renaissance of the Franciscan missionaries, working their way north through what are now New Mexico and Arizona to California; from Louisiana came a certain French quality which never extended beyond the boundaries of the state. Pennsylvania contributed a vaguely German quality, New York its memories of the Netherlands, while Massachusetts and Virginia brought in and perpetuated the English tradition of the seventeenth and eighteenth centuries. Only the last two influences achieved any degree of permanency or continuity, and these maintained themselves for a space of almost exactly two hundred years. After the lapse of three-quarters of another century the architecture of all these early periods was rediscovered, and the influence of the Spanish missions, the farmhouses of Pennsylvania, and the so-called "Georgian" work of New England and Virginia has played a large part in the building-up of good architecture after the degradation of seventy-five years that followed the extinction of the old traditions about the year 1825.

Much of the architecture of Mexico under the early Spanish domination was of a magnificence comparable with that of Spain itself, and to it was added a naïveté and a certain barbaric opulence contributed by the native workmen that gave it a place by itself. In the missions of the Southwest the magnificence was gone, but the spontaneousness remained, and the result was a group of simple and direct religious structures full of charm, and excellent models for the new work that was to come later on. The same value lay in the German and Dutch beginnings, and these have recently been used to the best effect in the notable Philadelphia school of domestic architecture which has produced such fine results during the first quarter of the present century. The "Colonial" tradition of Virginia and New England has been even more persistent and pervasive and has perhaps extended more widely than any other. In every case the prevailing influence has been toward that simplicity and directness which characterized all the work of the first two centuries of what now constitutes the United States.

The first settlers in English colonies brought with them little knowledge or craft of architecture, but they had a clear memory, while the real affection for beauty and fitness which had accompanied man throughout history, was still their heritage, and was not to be wholly extinguished for a period of nearly two centuries. At the time of their emigration the native Gothic had quite passed away and the new Renaissance imported from Italy had become thoroughly domesticated, so what they did here was of that mode, though fundamentally modified by new and local conditions. At the very start the persistent Tudor tradition had a certain effect, and many-gabled houses of irregular design, with big outside chimneys, gables of curvilinear form, Jacobean details, leaded and latticed windows and genuine half-timber construction were not uncommon. Nearly all of these have disappeared or been utterly transformed, so we do not realize how prevalent they were, but "Bacon's Castle" in Virginia and the "House of the Seven Gables" in Massachusetts give an idea of what was probably universal in houses of the larger sort prior to the year 1700.

English methods skillfully adapted in early building

During the first seventy-five years of the colonies money was scarce and building materials other than wood were unavailable; what brick there was came from England and Holland. The architecture was therefore a wooden architecture, and very cleverly and with fine instinct did the housewrights of the time adapt their English methods to the new circumstances. Later, when there was more wealth and bricks were either imported in greater quantities or made on the spot, the fully developed domestic Classic of Queen Anne was taken over, and there was a century of fine building when a truly local style of great distinction was developed along the entire seaboard of the thirteen original states. Housewrights became master builders, shipwrights turned into joiners and wood-carvers, while the necessity for economy and the lack of highly trained craftsmen enforced a certain simplicity and restraint that were most beneficial to good art. The houses of this period are all of extreme reserve and elegance, free of the pedantic quality that the professional architects of England were smiting into their work, always beautifully proportioned in whole and in part, and, with their sparing detail, of a refinement and distinction that even the Adam brothers might have envied.

Early examples of public buildings and churches

Public buildings were few and simple, and nearly all have been destroyed, the Old State House in Boston, Independence Hall in Philadelphia and the City Hall in New York City standing as fine examples. As for religious structures, the heavy hand of Puritanism in New England made impossible anything but an extremely ugly type of barn-like conventicle with no architectural value whatever, and it was not until a little later, when the Church of England was sufficiently tolerated to permit the building of its own structures, that some effort was made, as in Christ Church, Boston, to add something of beauty and variety to the Puritan norm, and along the lines of what Wren was doing in England. Outside the Puritan pale there was less reason for ugliness, and from New York south to Savannah there was an attempt at real beauty and at the preservation of some sense of historical continuity. Pennsylvania, Delaware, Virginia, South Carolina, all contributed charming and sometimes even noble churches, at first with curious hints of a sort of wistful Gothic memory, later with full acceptance of the mode fixed in England by Inigo Jones, Christopher Wren and Nicholas Hawksmoor.

From about the middle of the eighteenth century for a space of seventy-five years some really magnificent churches were built, at least in comparison with what had gone before, and among these must be counted Kings Chapel, Boston; St. Michael's, Charleston; Christ Church, Philadelphia. Most of these were designed on their general lines by amateurs, but in Boston the first professional architect had made his appearance in the person of Charles Bulfinch, and New England can still claim the honor of possessing much of his work. The housewright who had become so proficient as decorator and craftsman during the last century was even then at the height of his competency, McIntyre, of Salem, being a distinguished figure among many able men, and the architect of the time did little more than

plan a general scheme, leaving to carpenter, mason and joiner the application of all technical and ornamental detail and the responsibility for determining and carrying out the construction. Bulfinch was an educated gentleman and a conscientious citizen. He used his craftsmen generously and gave them wide opportunities through the magnitude of the work he undertook, while co-ordinating it in structures of great variety and scholarly and academic in form after the English fashion of the day.

By the time Andrew Jackson was elected to the presidency and a new political and social world had come into being, the varied strands of American building that reached back through two centuries had been knit together into a fine and very individual style, strictly American and quite cleverly differentiated from the architecture of seventeenth-century England, from which it had derived its first energy and inspiration. With the completion of the rebuilding of the Capitol in Washington—joint work of Thornton, Latrobe and Bulfinch—this period may be considered to have come to an end. Hitherto, however simple or primitive, nothing really bad had been produced; after this date, and for a period of more than half a century, there was little that was not bad, and that little was the result of the swift dying-away of the old inherent instinct for propriety and beauty, while the bad that held the stage was the worst that history has ever recorded.

A "Græco-Baptist" church.

The fine old Athenæum in Boston was one of those hold-overs from a better day, and numerous churches, North and South; but by the time of the War between the States the final catastrophe had been accomplished, and from then on to 1880 there was nothing to record that possessed any element of honor except some efforts to acclimatize the Victorian Gothic then in vogue in England.

The stately and pretentious "Roman mode," begun perhaps at the University of Virginia, and in which Thomas Jefferson played a large part, had dissolved into absurd box-like structures, both ecclesiastical and domestic, where amusing porticoes, carefully worked up from books on the Greek and Roman Orders, but made of neatly fitted strips of thin wood and painted white, were applied in the most arbitrary fashion to their utilitarian supporters, with their ill-proportioned windows and doors badly spaced in clapboarded walls broken only by the omnipresent green blinds—certainly the most "banderlog" type of building ever devised by man. Then came the eclecticism of the eminent Mr. Downing's villas and cottages "in the Italian mode," or the English, the Swiss or the French—pathetic distortions in flimsy materials of the good work of an earlier day, and then at last, what was even more horrific, the "Carpenters' Gothic" of the Forties in all its crass stupidity and positively vicious ugliness. Upjohn struggled vainly to stem the tide of barbarism, and in Trinity Church, New York, produced something that, in spite of its falsities of construction and its many imitations and the complete lack of scale in its details, really had something of the appearance and quality of an English parish church of the fourteenth century. Following after came Renwick, Congdon, Haight, the younger Upjohn, all able and conscientious men, and though success in larger churches such as St. Patrick's Cathedral and Grace Church in New York was not very marked, many really beautiful and rather original churches of smaller size were produced, carefully studied from English originals but intelligently adapted to local conditions.

Simultaneously the influence of John Ruskin was beginning to have its effect, and a sort of "Gothic" never yet seen on

sea or land put in its appearance. Never did any men work harder or more devotedly than the protagonists of this style. They were bound to get beauty, originality and truth, if they had to get it with an ax. Polished marbles and granite, stone- and wood-carvings of amazing ingenuity and elaboration were sedulously worked up from examples offered by the animal and vegetable kingdoms; every strange-colored stone and variety of slate was sought with avidity and combined in wild and wonderful patterns. Nothing was left alone; everything was elaborated to the last degree, and the result was something rich and strange. Ware, Van Brunt, Cummings in Boston, perhaps Furness in Philadelphia, were leaders, and whether history justifies their work or not, they deserve deep respect for their sincerity and their meticulous and unremitting work.

A house of the Victorian period.

So matters stood about the time of the Centennial in Philadelphia, when for the first time Americans began to be conscious of the fact (then to them revealed) that all was not for the æsthetic best in the best of all possible nations. It was something of a shock when the output of the ten years following Lee's surrender was suddenly brought forward for estimation. There had been, and was, a perfect riot of depraved and expensive viciousness in what was dubbed "jig-saw-and-batten" work, or for some unearthly reason was called "Queen Anne." As for the "French roof" style, no one knows where it came from or why; there was nothing French about it, and nowhere could one trace any resemblance to any known style or genre. It was the Topsy of architecture and even more unregenerate. And in the midst of this "witches' Sabbath" of futility and confusion something happened, and the name it bore was H. H. Richardson.

The eclecticism of the mid-century had had its sumptuous fruition in the châteaux of Fifth Avenue and the palaces of Newport, with Hunt, Post and Herter as the competent exponents thereof, and there could be nothing beyond along this line. Richardson dawned like a dynamic force, and a new but evanescent era dawned. Out of southern France and northern Spain he brought back to America what he had found there—a powerful, vital, semibarbarous, or at least half-developed art, and by his own stupendous vitality galvanized it into a semblance of reality. He was no copyist: what he took he transformed, and from Trinity Church, Boston, onward, for a few pregnant years he imposed on America his powerful and stimulating creations—titanic, original, and with a frankness, freshness and freedom that were like a fresh sea-wind dispersing miasma. He died at the height of his power, but as long as he lived there was only one possible style, "Richardson Romanesque," and every practitioner turned to it and tried to use it whether he could or not—and mostly he could not. The ponderous majesty of Trinity and the Pittsburgh Court House and the Albany City Hall was applied to fire-engine houses, primary schools, Baptist and Methodist conventicles and frame cottages with complete artistic abandon, and for a meagre interval America had indeed a "national style." Then the giant passed and the pigmies succeeded to his glory, for it was the tragedy of his case that only these remained. The King was dead but no one could be hailed with the cry, "Long live the King!" A very few of the coming men in the East produced creditable simulacra, then they gave up and reverted to more academic modes; while the wave of the "Romanesque decadence" rolled resistlessly west, submerging the plains and the mountains and the coast in its detritus of a lost cause, and finally vanished in the setting sun,

PUBLIC BUILDINGS OF TWO PERIODS

CITY HALL, NEW YORK CITY, JOHN McCOMB, ARCHITECT

CONNECTICUT STATE CAPITOL AT HARTFORD, RICHARD MICHELL UPJOHN, ARCHITECT

leaving in its wake a wide æsthetic desolation.

ARCHITECTURAL THOUGHT AWAKENED BY H. H. RICHARDSON

History will record H. H. Richardson as the greatest architectural force America has known, for one thing he had accomplished, and that was the awakening of the country from its architectural lethargy. There could now be no going-back: society was ready for a new impetus, and this arrived about 1890 in vigorous but extremely varied guise. There were no less than five lines of influence, each more or less directed by strong personalities. McKim, Mead and White had come forward as the protagonists of a fine and scholarly and exquisite Italianism, and from the day of the Boston Public Library this was almost the preponderating force. Good taste had returned after a banishment of seventy-five years. Carrère and Hastings took much the same field, but on it they imposed a most ingratiating romanticism and captivating poetry. The St. Augustine hotels were an inspiration to the whole profession. In Chicago that great genius Louis Sullivan, in some sense inheriting from Richardson, began developing a mystical philosophy of architecture and a strange new type of real beauty to express it—an art that was purely personal and "caviar to the general." Wilson Eyre in Philadelphia took domestic architecture as his field, with charm and picturesqueness as his guiding star, and became in a sense the pathbreaker for the very wonderful Philadelphia school that came almost immediately into being. In Boston, Cram, Goodhue and Ferguson gathered up the shattered remnants of the Gothic approximation, linked themselves with the young English expatriate Henry Vaughn, declared the Gothic style not dead but sleeping, and started in to take up the story of English Perpendicular Gothic, undo the work of Renaissance and Reformation, and go on from where the break occurred. Finally, and at many hands—Arthur Little, of Boston, being perhaps the most prominent—there was a recrudescence of the Colonial or Georgian idea, and once more architects began to get back to the inherent quality of the old eighteenth-century work, instead of mocking it, as they had just been doing, by silly travesties of its misapplied details.

THREE MAIN FORCES: CLASSICAL, GOTHIC, AMERICAN DOMESTIC

It was a sufficiently varied list of impulses, but all were vital and vigorous and all working to the good. Little by little some of them drew together and coalesced, until there were three main forces: the Classical, whether Italian, English or Modern French, which took to itself everything except churches, colleges and minor domestic architecture; the Gothic, which very shortly controlled practically all church-building together, in its transitional Tudor form, with a large proportion of university, college and school work; and what might be called the American Domestic style, which started from many bases, Colonial, "Mission," Tudor, Pennsylvania farmhouse, but generally worked itself out in terms of propriety, personality and most distinguished beauty.

These powerful educative influences now began to operate through the American Institute of Architects as a co-ordinating and directing force, through the schools of architecture which had appeared in so many places after the dynamic beginnings under Professor Ware, and through the excellent architectural magazines. At last architecture had taken its place as an exalted profession; there was a fine frenzy of emulation and a real spirit of unity and co-ordination. Architecture in America had attained its majority.

As the Philadelphia Fair had been a revelation of incapacity, so the Chicago Fair was a revelation of potentiality and a demonstration of beauty. Here for the first time all the great architects of Classical sympathies came together to work toward one end, and they produced a vision of Imperial Rome so beautiful and so stimulating that it had an indelible influence on society. With Burnham, of Chicago, as the chief inspiring and co-ordinating force, a dream of loveliness was created on the edges of ugliness, and after this there really could be no going-back.

Nor was there any such retrogression. It may be said that from then on there has been a steady advance along every line, until to-day America stands foremost among the nations in architecture and its allied arts—and all this the product of fifty years. It is a record hardly to be matched in history, except perhaps

BUILDINGS IN THE UNITED STATES

ST. PHILIP'S CHURCH,
CHARLESTON, S. C.
J. HYDE, ARCHITECT

CHRIST CHURCH (OLD NORTH), BOSTON, MASS.,
WILLIAM PRICE, ARCHITECT

FIRST CHURCH,
BENNINGTON, VERMONT
ASHER BENJAMIN, ARCHITECT

STATE HOUSE, BOSTON, MASS., CHARLES BULFINCH, ARCHITECT

PARSON CAPEN HOUSE, TOPSFIELD, MASS.

"WESTOVER," CHARLES CITY COUNTY, VA.

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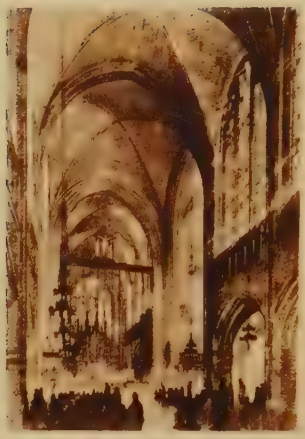
ST. PATRICK'S CATHEDRAL,
NEW YORK CITY,
RENWICK ARCHITECT



CHURCH OF ST. VINCENT FERRER,
NEW YORK CITY, BERTRAM
GROSVENOR GOODHUE, ARCHITECT

ST. THOMAS CHURCH, NEW YORK
CITY, CRAM, GOOLHUE AND
FERGUSON, ARCHITECTS

CATHEDRAL OF ST JOHN THE DIVINE NEW YORK CITY, CRAM AND FERGUSON, ARCHITECTS

TRINITY CHURCH, BOSTON, MASS
H H RICHARDSON, ARCHITECT

CARMELITE CONVENT, SANTA BARBARA, CAL.
MAGINNIS AND WALSH, ARCHITECTS

PROCTER HALL, PRINCETON UNIVERSITY, CRAM, GOODHUE AND FERGUSON, ARCHITECTS

HARKNESS QUADRANGLE, YALE UNIVERSITY, JAMES GAMBLE ROGERS, ARCHITECT

SCOTTISH RITE TEMPLE, WASHINGTON, D. C. JOHN RUSSELL POPE, ARCHITECT

NEBRASKA STATE CAPITOL, LINCOLN, NEBRASKA, BERTRAM GROSVENOR GOODHUE, ARCHITECT

PUBLIC LIBRARY, INDIANAPOLIS, IND. PAUL CRET, ZANTZINGER, BORIE AND MEDARY, ARCHITECTS

PUBLIC LIBRARY, BOSTON, MASS McKIM, MEAD AND WHITE ARCHITECTS

PEABODY MUSEUM, YALE UNIVERSITY
DAY AND KLAUDER ARCHITECTS

MINNESOTA STATE CAPITOL, ST. PAUL, MINN.,
CASS GILBERT, ARCHITECT

WOOLWORTH BUILDING, NEW YORK CITY,
CASS GILBERT, ARCHITECT

SHELTON HOTEL, NEW YORK CITY,
ARTHUR LOOMIS HARMON, ARCHITECT

PRATT HOUSE, GLEN COVE, LONG ISLAND,
TROWBRIDGE AND ACKERMAN, ARCHITECTS

HOUSE IN PASADENA, CAL.,
MARSTON, VAN PELT AND MAYBURY, ARCHITECTS

in a similar space of time at the beginning of the thirteenth and again in the seventeenth century, and in both the latter cases the start was from something fine in its own way, not from unspeakable degradation.

CLASSICAL FORMS ADAPTED SUCCESSFULLY TO NEW USES

In the Classical field there has been no yielding, except in unimportant sporadic cases, to the degenerate approximations of Teutonic *"Art Nouveau"* or the Parisian absurdities of the Boulevard Raspail. The civic architecture of America is almost exclusively noble, dignified and self-respecting, from the new buildings in Washington, through the numerous state capitols, to the city halls, libraries and post offices of the whole continent. Classical forms are seldom used pedantically, but rather with freedom and suppleness and an unerring sense of beauty and propriety. In many cases these Classical precedents have been employed with an originality that is almost a continuation of tradition and life, rather than an imitation or a recreation, as, for example, the Indianapolis Library, or the Scottish Rite Temple and the Pan-American Building in Washington. Perhaps the most striking and vital of these works is the Nebraska State Capitol, one of the great masterpieces of modern art, while from a different field should certainly be drawn the Grand Central Railway Station in New York, first in the great galaxy of similar structures so expressive of American civilization.

The Gothic, or rather Medieval, movement has achieved equal originality, consistency and beauty. From its late English beginnings it has broadened out until it lays the whole period of the Middle Ages under tribute. English, French, Teutonic and Spanish Gothic all contribute something, and in addition there has been a rediscovery of Lombard and Romanesque architecture in all their grave dignity and almost naïve directness and simplicity. The archæological period has passed, and now architects are really thinking in the terms of the styles they use for inspiration and the times and the undying forces that brought them into existence. The new Christian architecture of America is full of reality, full of vitality, and where twenty-five years ago there were not five men who were working intelligently along this particular line, there now must be forty or fifty at least, mostly of the younger generation, and all doing work that is unquestionably the only living ecclesiastical architecture in the world, barring only England, where Sir Giles Scott still proves that the old mastery of the last half of the nineteenth century has not yet wholly passed away. Nor is this return to the Middle Ages confined to the historical churches, Roman and Anglican. Protestantism also has adopted the architecture of Catholic Europe as its own. Local conditions sometimes indicate Colonial or Georgian, but in every case this is immensely enriched beyond the old Puritan mode, while the liturgical arrangements are usually those of the Episcopal Church. In the West and Southwest the same influences suggest an adaptation and amplification of the primitive missions, but apart from Christian Science, Classical styles have been completely abandoned.

GOTHIC, TUDOR AND OTHER MODES IN THE UNIVERSITIES

This same Gothic movement has permeated the institutions of higher learning, and since Columbia University in New York, no college has accepted Classic as its mode of expression, though those that were preponderantly Colonial, together with preparatory schools of the same history, have gone back to their stylistic origins and are adding new work of very vital character. Generally speaking, as at Princeton, Yale and the University of Chicago, the one style is now some version of Tudor as this shows itself at Oxford and Cambridge, and superb indeed are the new creations, as, for example, in the dream-like Harkness Dormitories at Yale. The work of restoration really began at Princeton under Cope & Stewardson, it was continued at West Point in a more military style, and then the major part of the other great schools surrendered at discretion, always excepting Harvard, which, after a Babylonian exile among the alien gods of Victorian Gothic, "Queen Anne" and Richardson Romanesque, returned to the eighteenth century with most admirable results.

In domestic architecture there is still much of the old eclecticism, which is as it should be, the nation being what it is and its civilization what it is, but nowhere, not even in the great new field of commercial building America has now made

wholly its own, have finer and more personal results been achieved, and this is true of all parts of the country. From New England, New York, Philadelphia, the Middle West, the Pacific coast have come new schools of house-building, all of them vigorous, personal, based on admirable precedents, full of beauty and distinction, and all hanging together in a way, though so different in their inception. It is doubtful if there has been any domestic architecture of so high a grade anywhere in the world, for certainly a century or more. In almost every case the work adapts itself with great sensibility to its environment and to the tradition and the personality, if not of the individual owner, at least to the general atmosphere of which he is a part, while the consideration of materials, textures and values, even if it is occasionally a little artificial, gives it a quality of extreme distinction.

Post Headquarters, United States Military Academy, West Point, New York. Cram, Goodhue & Ferguson, architects.

In one direction American architecture during the last twenty-five years has achieved an eminence that is unexampled in recent times, and stands by itself in that it owes nothing to history or precedent and is wholly original. It would be impossible to overestimate the quality of the structures that at last have grown out of the use of steel and ferro-concrete. Here was a new combination of materials, one of them hitherto unheard of in history, that implied and demanded an entirely new architectural expression, not only because of the nature of the materials themselves, but because of what they made possible in the way of vertical expansion. At first there was no effort whatever at logical stylistic development, and the first steel-frame buildings were nothing but architectural imitations and subterfuges, intrinsically no better than the "jig-saw and batten" "Carpenters' Gothic" of the mid-nineteenth century. Little by little, however, and following the line first indicated by Cass Gilbert, something more rational and logical began to appear; twenty- or thirty-story buildings ceased to pretend to be of masonry construction drawn out to impossible heights, and took on something of the aspect of whatever they really were. The impossibility of permitting an entire section of a city planned for seventy-foot structures to be built up to a height of hundreds of feet, compelled rational cities to establish restrictions by means of setbacks, and so on, that immediately resulted in more or less pyramidal erections, and the result has been the unique and logical, and in a way strangely beautiful, architecture of business and commerce that has given New York a distinction all its own. It is one of the great triumphs of the art of building, and, without instituting comparisons or trying to fix ratios of value, it may justly be ranked with the other triumphs of a great art that have been recorded in history.

There is no better evidence of the essential vitality and dynamic force inherent in American architecture than this adaptation and development of the structure to meet new conditions of life and its activities. In the light of this manifestation it is possible to regard the architectural future with some complacency, as we turn from reviewing the long record of the architectural past.

THE NEXT STORY OF THE FINE ARTS IS ON PAGE 6767.

Photo, International Newsreel.

WHY DOES THE WIND BLOW?

CONTINUED FROM 6558

WHEN we look at a weather-vane we can tell from what direction the wind is blowing. The revolving part of a weather-vane has much more surface at one side than it has at the other and the side with the bigger surface is blown away from the wind. Thus the smaller part is at the side from which the wind is coming. Arms are generally fixed to the stem of a weather-vane, and at the end of these arms are the letters N, S, E, W, indicating the four directions of north, south, east and west. If the arrow of the vane or the head of the weather-cock points north, we know that the wind is blowing from that direction.

It is easy enough to read the weather-vane, and it will perhaps suggest a number of other interesting questions.

The revolving part may be in the form of a horse or a dog, but the principle is the same.

Why, for instance, does the wind blow at all? Why does it not always remain still, as it does sometimes in summer? Why does it sometimes blow gently, sometimes strongly, and sometimes rage in a hurricane? Why does it blow sometimes from the north, sometimes from the south, and sometimes from the east or west? Finally, why do some kinds of wind bring some kinds of weather, and other kinds of wind bring other kinds of weather?

The science of wind and weather is called *meteorology*. The word comes from two Greek words meaning "to raise beyond." The word *meteor* now means only a fragment from another world that comes flying into our atmosphere; but formerly meteor had a wider meaning. Anything connected with the atmosphere was called a meteor, and so the science of the weather became known as meteorology.

Now we come back to the first question: Why does the wind blow? For the same reason that smoke comes out of a chimney. That is a curious answer, but it is correct. The real cause of the wind is that air expands and rises as it becomes hotter. If we take an empty bottle, stop its mouth with a cork, and place it in front of a fire, either the cork will pop out or the bottle will burst. The air inside the bottle wants more room. By this experiment we can prove that, even in a small space, air does not remain motionless if temperature changes.

Now, the sun shines upon this world and heats the air in certain parts. The warmed air, being lighter than cold air, rises; and cold air, being heavier than warm air, rushes in to fill up the place

which the warmer air occupied before it began to rise. That is the reason why the wind blows, given as simply as it can be given.

Generally, a breeze from the sea begins to blow on to the land a few hours after the sun has risen. Again let us ask—why? Land becomes warmer than water under the heat of the sun, so the air on the land rises, and the cooler air from the sea blows in to take its place, only to be warmed in its turn, and to allow more cool air to blow in from the sea. When the sun has set, the land becomes cool more quickly than the sea, so that the air above the land is denser, or heavier, than the air above the sea, and the cooler land air blows out to sea to replace the warmer sea air that is rising because it is warmer.

WHY ARE SOME WINDS WARM AND SOME COLD?

Winds become like the surface of the earth over which they travel. A wind that blows over a hot, dry desert becomes hot and dry; a wind that blows over ice-fields and snow-clad mountain-tops becomes piercingly cold; a wind that blows from, or over, the sea is likely to bring rain.

Whatever wind may blow, it has its cause in the inequality of temperature and heaviness in the atmosphere. Nature strives for equality, and warm breezes and cold blasts are Nature's way of equalizing matters.

WHAT IS A WHIRLWIND?

In some parts of our country the whirlwind, or cyclone, is much dreaded. The whirlwind is caused by winds coming from opposite directions at the same time. When such winds meet they make a circular motion with great violence, and, being pressed on by more wind coming behind, may be driven upward with such force that at sea they may lift a column of water with them, thereby making a water-spout.

At times terrible gales sweep the sea. Before the days of steamships sailors used to look forward with dread to the autumnal gales. Often they would battle with the elements for days together.

The sails would be torn to shreds by the fury of the wind. The mighty, foaming seas would charge upon the ship like an invading host, throwing themselves with terrific force upon the decks, and sometimes carrying away the masts. The gales are not such a danger to shipping as they once were, for nowadays steamships are independent of the wind for their motive power, and so they plow their way doggedly through the boisterous sea until they reach the desired port.

WHAT IS A TORNADO?

The word *tornado* means "turning," and from this we may readily see that it is a kind of whirlwind. It is caused by the air becoming so hot that it rises with frightful rapidity. This causes a sort of vacuum which the air all round rushes in to fill. As the air is carried up it becomes cooler, expands, and forms a cloud, which spreads itself outward in the sky so that the tornado looks like a huge funnel hanging from a heavy black cloud. The force of the mad dance of the currents as they meet carries the tornado onward, and its appearance as it whirls along its path of destruction is terrific. The motion of the currents usually commences close to the ground, but a tornado may be carried along some distance up in the air. The speed with which it moves is so great that it sweeps everything before it; but happily it takes a much narrower path than a whirlwind does, and as a rule it does not last long.

WHAT IS A CLOUD-BURST?

A cloud-burst is also caused by a whirlwind. Sometimes the currents of hot air which rush up from the surface of the earth are met in the upper regions by a current of cold air. When this happens the moisture which the hot current has carried up from the ground rapidly becomes condensed and falls to the earth again in a sudden deluge of rain. This is called a cloud-burst.

IS IMPURE AIR LIGHTER THAN PURE AIR?

We are likely to be misled on this point, for other things affect the weight of air besides the kind of stuff that is in it. One of the most important of these things is its temperature. It is true that in a room or church or theatre the impure air is lighter than the pure air, and therefore it ascends. But though this is true, it is not true that impure air is lighter than pure air. The impure air made by human beings or animals, or by fires, gas-jets, lamps or candles is hot because it is made by the process of burning, whether inside

our bodies or outside them, and that process produces heat. Now, the hotter the air is, the lighter it is.

But if we were to wait until this impure air had cooled, we should find that the impure part of it was heavier than the air. The most important gas in impure air is carbon dioxid, and this is heavier than ordinary air of the same temperature. Thus, in caves and mines where carbon dioxid is formed, it always tends to lie as low as possible. This is a fact which every miner knows; and it is a very interesting experiment to lower a lamp down an old mine, or a well, and find that when it has dropped a certain distance it goes out because it has reached the level of the carbon dioxid.

DOES CHANGE GO ON IN OTHER WORLDS?

We know from our study of the surface of the earth that in the course of long ages it has changed very much. But men have been inclined to suppose that the skies do not show any change except in the position of the stars. However, when we study the sun and the planets by means of powerful telescopes we find that all sorts of slow changes are going on in the heavenly bodies. Perhaps sun-spots need not be counted, as they come and go, and no one can say that there is any evidence of any changes in the sun going on steadily in one direction. But there is no doubt as to changes in at least two planets, Jupiter and Mars.

On the surface of Jupiter, the giant planet, there is a curious marking called the great red spot; and during the years that this has been watched it has certainly shown changes in shape and size and color. They are, indeed, much quicker than the changes on the earth that happen at the present time; but the surface of Jupiter is much hotter than the surface of the earth, which has mostly become set and rigid, while on Jupiter the surface is more fluid, and, indeed, so hot that it probably gives out some light of its own still. As for Mars, it shows many changes both in large features and in small. Considerable areas of Mars, which must once have been ocean-beds, are now certainly dry.

WHY DOES YEAST MAKE BREAD RISE AND BISCUITS BUBBLE?

Yeast is a simple kind of living plant which produces a substance called a ferment, which has the power of causing certain chemical changes in sugar. When yeast is used to make bread the results all follow from the fermentation of sugar. Sugar is an extremely complicated substance, containing three kinds of atoms—carbon, hydrogen and oxygen. When it is fermented the sugar is partly burned—that is to say, the ferment takes a certain amount of oxygen from the air and adds it to the sugar, which is decomposed and turned into something else. If anything made of carbon, hydrogen and oxygen is completely burned, the result will be carbon dioxid from the burning of the carbon, and water from the burning of the hydrogen. In this case the burning is not complete, but still a good deal of carbon dioxid is formed, and this makes the bubbles which form in the dough and cause it to rise. A good deal of it escapes into the air, but much is caught.

The other thing that results from the fermentation of the sugar is alcohol, which is also a compound, though a much simpler one, of carbon, hydrogen and oxygen. For this reason the process we have been describing is usually known as the "alcoholic fermentation of sugar." Practically the whole of the alcohol flies away into the air and is lost.

WHAT IS THE DIFFERENCE BETWEEN A FRUIT AND A VEGETABLE?

In ordinary talk we usually make a distinction between fruits and vegetables, but most people could scarcely say what the difference really is. All living creatures are divided into two great classes—animal and vegetable—and every kind of fruit belongs to the class of vegetables.

Still, though an apple or a strawberry is just as much a vegetable as a cabbage or a potato, we can find a distinction between them. Indeed, students of plants use the word fruit in a definite way. Many kinds of plants do not produce a fruit at all, but all the higher plants do, even including the greatest trees. The fruit of a plant is that part of it which contains the seed. Indeed, the fruit and the plant exist in order to produce the seed. When we study the history of the fruit we find that it always comes from the flower. The purpose of the flower is to form the seed; and then the flower disappears and we have, instead, the fruit, which holds the seed for its destiny.

Thus some of the things that we usually call "vegetables," such as tomatoes and cucumbers, are fruits in the proper sense of the word, because they bear the seed.

WHAT ARE SUN-SPOTS?

Sun-spots were first seen by Galileo in 1609, more than three hundred years ago. These dark spots have now been examined not only by huge telescopes, but also by having the light from them studied separately in other ways. S. P. Langley and C. G. Abbot, two American astronomers, have found what sun-spots are.

They are a sort of magnetic storm in the gases that make the atmosphere of the sun. Those in one half of the sun always twist in the opposite direction from those in the other half, as is the case also with movements of the air upon the earth.

The light from sun-spots, when examined, is found to have been affected by a special kind of force called magnetism. That is one reason why we know that sun-spots are really a sort of magnetic storm of a special kind in the sun's atmosphere.

Magnets on the earth are affected by sun-spots; and it may be that there is also a close connection between sun-spots and weather—or, perhaps, not so much the weather as it is from day to day, as the climate over several years. We know that sun-spots regularly increase and decrease in number every eleven years.

But we must not say that the sun-spots move the magnetic needles on the earth or change the weather. Whatever is the cause of sun-spots—perhaps something not in the sun at all—causes at the same time sun-spots on the sun and magnetic disturbances on the earth.

WHY IS THE SNOW WHITE?

You might have asked also why is foam white when a wave breaks. In both cases we know that we are dealing with water, and yet, instead of being transparent, which means that it lets the light through, it is white. We understand at once when we find out what snow and foam are made of, or, rather, what is the state of the water that makes them. In the case of snow, the water is frozen and forms tiny little crystals of beautiful shape.

These all lie loosely together, forming the snow, and though, if you could take one of them by itself, light would go through it just as it will go through a piece of clear ice, or many other crystals, yet when you have a heap of crystals lying together, all turned different ways, they throw the light back in all directions, just as salt does. They do not keep any part of the white light that falls on them, but throw it all back, and so snow is white. But, of course, if you have colored light falling on the snow, then the snow throws back that same color.

WHAT DO WE MEAN WHEN WE SPEAK OF A CALORIE?

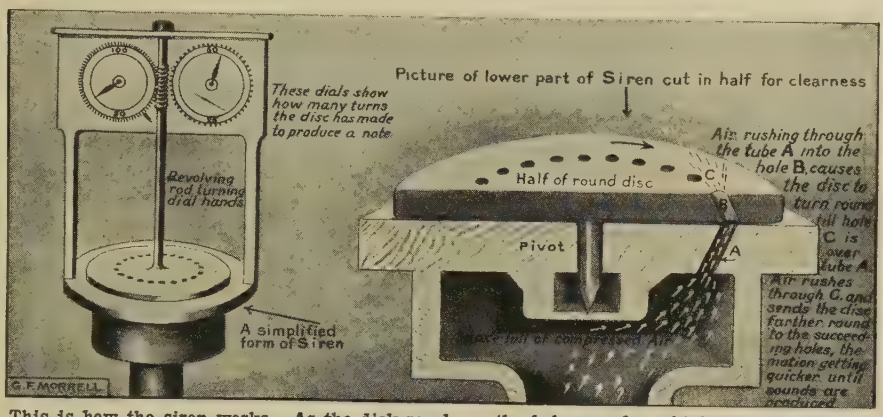
If a person wishes good health, his food supply is one of the few things demanding constant attention. If one eats simply to satisfy his appetite, he makes an error. It is now well known that the human body calls for heat and for constructive material—iron, sulphur, carbon, phosphorus, and so on. One may eat so as to obtain much heat and little constructive material; or he may obtain much of the latter and little of the former.

The heat needed by the human body and obtained through digestion is spoken of as 2,000 greater Calories each day. Now, one such Calorie is the heat required to raise the temperature of one kilogram of water one degree Centigrade. This amount of heat, when put to work, can lift one half of a ton of matter 40.4 inches. Therefore 2,000 greater Calories (the heat used by a human body per day) is sufficient to lift 1,000 tons of matter 40.4 inches. In other words, our heat requirements per day *must* be sufficient to enable us to do the equivalent of the work just mentioned. It is needless to mention that we use that amount of heat unconsciously. We should never eat more than we need, for the effect is much the same as would be produced by putting too much coal in the furnace.

WHAT HAPPENS INSIDE A CAT WHEN IT PURRS?

The noise a cat makes when it purrs is really a kind of talking, for it tells you that the cat has a certain kind of feeling. It feels pleased and happy, and it says so in its own way. If you put your hand on it when it purrs you can feel its whole body vibrating, or trembling. When anyone speaks or sings—especially if he is a man with a voice low in pitch—if you put your hand on his chest you can feel him vibrate, or tremble, just like the cat. In the case of the man we know that it is his vocal cords, as they are called, in his throat which he has set trembling, and they have set the whole of his chest trembling.

THE NEXT WONDER QUESTIONS ARE ON PAGE 7029.


These dials show how many turns the disc has made to produce a note
Revolving rod turning dial hands
A simplified form of Siren
Picture of lower part of Siren cut in half for clearness
Air rushing through the tube A into the hole B causes the disc to turn round till hole C is over tube A
Half of round disc
Pivot
Air rushes through C and sends the disc farther round to the succeeding holes, the motion getting quicker until sounds are produced
G.F.MORRELL

This is how the siren works. As the disk revolves, the holes are brought in rapid succession over the tube A, and the puffs of air passing through these holes produce a sound. The dials record the turns of the disk from which the number of puffs and sound-waves can be calculated.

WONDERFUL, WONDERFUL MUSIC

CONTINUED FROM 6439

THE great art of music is a strict science having perfectly definite laws based on the facts of sound. The music of long ago consisted entirely of melody—that is to say, tunes which are usually very simple, but have only one note sounded at a time. We know, however, that it is very pleasant to the ear sometimes to hear two or more notes sounding at one time; we know, also, that sometimes it is very unpleasant. When the sound is pleasant we call it a harmony; when it is unpleasant we call it a discord.

The greater part of the progress in modern music depends on the progress in harmony, and all lovers of music would be sorry to have to be limited to melody, now that it is possible to add so much to it by means of harmony. It is extremely interesting to discover, if possible, what makes harmony and what makes discord. The difference to our ears is very great, and there surely must be some rule that materially affects the nature of the sound, if only we could find out what that rule is. Again, it is very interesting to notice that there are certain kinds of harmony where the notes sounded together seem so much alike that we do not even speak of them as making a harmony. For instance, two different C's on the piano have certainly not the same sound, yet they are so much like each other that when they are sounded together it is very much the same as if we were listening to one of them. Now, we might very easily suppose that our feeling that there is a sort of likeness or family resemblance between notes would depend on their being near to each other. Yet a C sounds very much like another C, even perhaps two or three octaves away, and unlike a note next to it, such as B or C sharp. This we soon notice if we sound two notes next to each other together.

The great law is that the ear judges by relations, or, to use the proper word, *ratios*. When we compare any harmony with any discord, the difference is in the ratios, or relations, between the numbers of the notes. We know that every possible musical note means a definite number of air-waves striking the ear in a single second of time. On the relations between those numbers all harmony and, indeed, all music depend. The simplest possible relation between two numbers is plainly the relation of 2 to 1. Nothing else could be quite so simple as that, unless the two numbers are actually the same.

Now this relation of 2 to 1 gives our ears the impression of the closest resemblance and harmony that are possible. Two notes making an octave have this relation between them, and no matter whereabouts in the scale we take them, they will always have the same effect on the ear. One note may have 24 vibrations a second, and the other 48, or the numbers may be 15,001 and 30,002, but their ratio is as 1 to 2, and so the one sounds almost like the double of the other.

All modern music is based on this fact, and by filling in the interval between the one note and the other with a varying number of other notes chosen in a certain way we form what is called a scale. Nothing would be easier than for a player on the violin to play a scale, or any number of scales, which we should call simply hideous. On the other hand, there are certain scales which the ear likes very much. Some of them have the effect of being mournful, and some of being untroubled or even gay.

THE MUSICIAN'S A B C, THE SCALE OF NOTES ON WHICH ALL MUSIC IS BUILT

Ever since music began, and in all parts of the world where it has existed, it has depended on the use of a scale, or set of notes. For instance, one set of notes was used long ago in England and in Scotland, certain sets were used in Greece, and certain sets are used to-day in India and Japan.

In every case the particular set or sets of notes make up the alphabet of the musician. A clever musician can at once tell when he hears a tune, like one of the beautiful old Scottish tunes, to what period it belongs and from what place it came, because he recognizes the scale from which the composer has chosen his notes.

Let us first look at the ordinary scale that we can play on the piano by simply touching the white notes from C to C. To our ears, accustomed from our earliest years to hear this scale, and to hear tunes made from it, this sounds natural, and any other scale at first sounds rather peculiar and less natural. But every musical scale has its definite laws, always to be found by studying the vibration numbers of the notes that make it. To this we must add that the numbers themselves are of no importance; the whole point is the relation between them. Any kind of scale may start on a note of any number, but all the other notes in the scale will have a fixed relation to that number, and those relations make the scale. We shall recognize it, and it will have the same effect on our ears whether it is played in a low key or a high one; it will be the same scale, whether played by a bassoon or a flute or a violin.

THE RELATION BETWEEN THE DIFFERENT NOTES OF THE SCALES

It is quite easy to write down exactly the ratios of all the notes in the ordinary scale of C major, which most of us know so well. Let us suppose, just for the sake of the argument, that the lower C happens to have a vibration number of 24 per second; it might just as well be 25 or 250½ per second. But 24 is a convenient number, and, if it is 24, then we can find out exactly what all the other numbers will be. Here they are set out in order and showing their relation:

C	D	E	F	G	A	B	C
24	27	30	32	36	40	45	48

Now, there is no point in these numbers themselves, but there is point in the relation existing between them. The first thing we notice, of course, is that the ratio between the two notes that make the octave is the ratio of 24 to 48, and that is the ratio of 1 to 2. The next simplest ratio that we can notice is that of C to G, for C is 24 and G is 36, so that the ratio is that of 2 to 3. One more ratio we may note, the ratio of C to E, which is that of 24 to 30, or 4 to 5.

Now, if we take the notes that we have observed, C, E, G, C, we find, to begin with, that they make the common chord, the sound of which we all know so well, for most pieces of music end with it. If it comes in the middle of a piece of music, we are likely to think that we have reached the end.

THE COMMON CHORD THAT MOVES MEN ALL OVER THE WORLD

That is the peculiar quality of this wonderful chord: it sounds final. After other combinations of notes the ear expects more. But the ear is always content with this; it requires nothing to finish it or to carry it on. Now, in the case we have chosen, the vibration numbers of these four notes are 24, 30, 36 and 48. If we reduce these we see that the ratios are those of 4, 5, 6 and 8. Now, it does not matter where we hear a common chord or what note it starts on, the ratios

of the four notes making it are always those of 4, 5, 6 and 8.

This is really very wonderful. If we look at 4, 5, 6 and 8 on a piece of paper and study them, we are studying arithmetic, a simple branch of mathematics. Its laws apply directly to some of the deepest and most wonderful feelings of which we are capable. Considered in themselves, the ratios 4, 5, 6 and 8 are quite dry; they seem to have nothing to do with mankind. Yet all over the world, in all ages, men have only to hear this ratio made in sound-waves and they always receive a certain set of definite impressions. To trained and untrained ears alike the ratio means music as distinguished from noise; it means harmony as distinguished from discord; and it has the peculiar quality of saying, "This is the end," not merely pleasing the ear, but satisfying it.

If we went further into the matter we should find that there are other ratios which always tell the ear that there is more to follow; yet the absolute difference between these two qualities depends on abstract arithmetic—the difference between the ratio of one set of numbers and the ratio of another set.

These simple facts, so well known to all musicians and students of sound and of the ear, are full of the highest meaning if we have wisdom to see it. Anyone who had not thought wisely and deeply about the world would have supposed that no two things could be farther apart than, on the one hand, our feelings of yearning and satisfaction, or sadness and joy, and, on the other hand, the arithmetical ratios between a certain set of numbers. Yet these two utterly different and unrelated things, as they seem to be, are eternally bound together by the laws of nature and of man. Let us now print again the notes of the scale and their vibration numbers in the case where we happened to start with 24, and underneath these let us print the ratios of these numbers:

THE VILLAGE CHOIR—From the painting by Thomas Webster.

C	D	E	F	G	A	B	C
24	27	30	32	36	40	45	48
1	$\frac{9}{8}$	$\frac{5}{4}$	$\frac{4}{3}$	$\frac{3}{2}$	$\frac{5}{3}$	$\frac{15}{8}$	2

We notice that these fractions vary in simplicity. The simplest is the fraction

corresponding to G, and the next simplest is that of E, which is just halfway between C and G. These give us the common chord. It is very interesting to notice that one fraction in the above list is very decidedly less simple than any of the others—that is the fraction $\frac{15}{8}$, corresponding to the note B in the scale of C.

Now, we are all quite able to sing a scale, and it is quite natural to us to strike the last note but one, which in this case is B. But when we have noticed that this ratio is really the least simple of them all, it is very interesting to learn from the history of music that this particular ratio had to be discovered.

THE NEW MUSICAL NOTES THAT WERE DISCOVERED IN RECENT TIMES

It appears that to whatever part of the world we go we find a time when the ears of musicians had not discovered this ratio as a way of getting from A to C. So they stopped at A. Very often, also, they had not discovered the ratio $\frac{4}{3}$, which corresponds to F. So it was that they had simply a scale made of five tones: C, D, E, G, A. This is the very famous five-tone, or *pentatonic,* scale, which we may say was the great scale of music until comparatively recent times, and the discovery of F, and more especially of the difficult ratio B, from which the scale can climb to a note exactly double of the note it started with, and so finish beautifully.

There is no end to what might be learned about the different kinds of scales, but what has been said gives us the key to the wonderful facts; and we discover that music may really be looked upon as a branch of applied mathematics, an application of the laws of the ratios of numbers.

When we are playing a scale of any kind on the piano or on the violin, or when we are singing it, perhaps one of the notes we make sounds quite wrong, and we say that it is out of tune. What does this mean? There is nothing the matter with the note itself, remember, though, occurring where it does, it sounds so unpleasant that we are apt to think so. It may in itself be a lovely note, rich and clear, brilliant or tender. Nevertheless, where we hear it—perhaps in a scale or in the course of a song or a piece—it is dreadful.

WHAT HAPPENS WHEN THE PIANO IS OUT OF TUNE

The reason is that the vibration number of that note does not have the ratio it should have to the other notes. It is out of tune with them, or we might say that they are all out of tune with it. Anyway, the ratio is wrong. If it is wrong because the vibration number is too small, we call the note flat; if the vibration number is too high, we call the note sharp.

One of the commonest mistakes in singing and in playing the violin is to make the notes flat. No matter how beautiful the voice or the tone of the violin, no matter how expressively played, no matter how good the rhythm, how well judged the varieties of time or anything else, no one can forgive music that is out of tune. Everything else may be right, but if the arithmetic is wrong, the result is not music.

HOW FIVE NEW NOTES WERE ADDED TO THE ORDINARY SCALE

It is right to ask what is the meaning of the black notes on the piano, lying here and there between the white ones that make the scale of C. What has happened is that in the course of the development of music the first great stage in the development of a scale has yielded to a second. The first great stage was when the five-note scale was improved into the ordinary scale we know so well. We are quite right to say "improved," because nothing was lost in the process. The five-note scale is still there, of course, included in the other.

The next great stage was to add five more notes at certain places in between pairs of the notes of the ordinary scale. If now we play all these notes in order on any instrument we get exactly the same sound and result as when we play all the notes on the piano, one after the other, including the five new black notes with the older white ones.

The arrangement of this new scale is such that the distance between any two notes is much less than it is in the simpler scale. For instance, if we look at our table, at E, F and G, we see that from E to F it is only half as wide a space as from F to G. Well, in the new scale with the black notes, a black note, which we call F sharp, has been put in between F and G, so that the intervals from E to F, from F to F sharp, and from F sharp to G are equal. The older scale, made by the white notes, is known as the *diatonic* scale, and the newer one with the black notes included is called the *chromatic* scale.

THE KIND OF TUNES THAT CHILDREN LIKE AND UNDERSTAND

If now we compare the three scales, pentatonic, diatonic and chromatic, we can understand something of the development of music. Not a great amount of variety can be yielded by the oldest simple scale. The results may have been lovely, but they were limited. It is this lack of variety that makes the difference between the diatonic scale and the chromatic scale.

During the last hundred years or so the chromatic scale has been used to a greater extent as the basis for composition. It is easy to understand that when children are learning music the tunes they enjoy and understand first are based on the simpler scales. Everyone enjoys these tunes, but it is only a comparatively small proportion of people who care for tunes built on the chromatic scale. Some people will say of a modern piece of music that there is no tune in it, but others, whose ears are better developed musically, know very well that there may be tunes in the newer music as well, only they are built on a less simple scale.

THE SECRET OF THE VIOLIN AND ITS STRINGS

If we chose to write all music down in the form of arithmetical ratios, which might be done, it could doubtless be shown how people can be classed according to the development of their musical ear by nature and education, beginning with those who can follow simple ratios like 2 to 1 and 3 to 2 and 5 to 4, and ending with those who can follow the more difficult ratios that are used so much in modern music.

Stringed instruments are so valuable in music, and the behavior of stretched strings is, in any case, so interesting that it has been very carefully studied. If we look at a violin and notice how it is used, we shall see that there are three facts about a string which decide the rate at which it vibrates.

To begin with, we notice that the strings which make the lower notes are thicker than those which make the higher. This is because of the law that the rate of vibrations of a heavy string is less than that of a light string. The heaviness, or, rather, the mass, of a string will depend partly on the density of the material and partly on the thickness of it.

Secondly, we notice that it makes a difference to the violinist how tight his strings are. When he tunes his instrument he is turning the pegs which decide how tight the strings shall be. The tighter the string, the more quickly it vibrates and the higher the note becomes. If we increase the tightness by 4, the string vibrates twice as often; if by 9, it vibrates 3 times as often—4 being 2 multiplied by itself and 9 being 3 multiplied by itself. That is the law for all cases.

THE NOTE THAT IS DIFFERENT ON DIFFERENT INSTRUMENTS

Lastly, we notice that when the violinist plays he is constantly moving the fingers of his left hand and pressing on the strings. This is simply the most convenient way of altering their length, for when he presses on, or stops, a string at any point it is just as if the string stopped there altogether. We also notice that when he is playing high notes his fingers come farther down, to make the strings shorter. The shorter the string, the higher the note.

There is a deeply interesting question which we have not yet discussed at all. Let us suppose that the C of the piano is 24, as we did before. Now, we may have an organ and a violin and a voice, and many other kinds of instruments, all sounding this same note, and yet the sounds are very different. Everyone would instantly know which was the note made by the violin and which was the note made by the piano.

Clever people, too, can tell one piano from another, and it is often easy to tell one violin from another, and we can all tell the voice of one friend from that of another. This is true even though it is the same note that is being sounded in all these cases, and it is very interesting to discover where the difference lies.

THE MUSIC OF THE SIMPLE WAVES AND THE MUSIC OF THE MIXED WAVES

To begin with, there are some kinds of musical instruments where the differences are not to be found. Tuning-forks, for instance, professing to sound the same note, really do sound the same note, without the difference that there is between a cheap violin and a good one. On careful study we find the reason for this difference. In the case of a tuning-fork the sound-waves are perfectly simple; but in the case of a violin or a voice or a piano or an organ-pipe, it is rather as if the waves were like big billows of the sea with little ripples on them, and with per-

haps tinier ripples on these ripples, if our eyes could see them.

Now, it makes a very great difference to our ears whether sound-waves are simple, like a line simply waving plainly up and down, or complicated, with all sorts of smaller waves mixed up with the main wave. All the sounds that are valued in music are made up of these mixed waves. The main wave is called the *fundamental note* or *tone,* and all the other smaller waves which go with it are called *overtones* or *harmonics.*

WHY DIFFERENT INSTRUMENTS MAKE DIFFERENT SOUNDS

These overtones are interesting equally to the student of sound and to the student of music. It is the quality, the number and the relative loudness of the overtones that make the difference between one instrument and another, and one voice and another, even though they are all sounding the same fundamental note. This means that nearly all the musical notes we hear are really not single notes so much as combinations of notes. They are really harmonies, only we scarcely notice them as such because the lowest note of the chord is so very much louder than all the others; yet they are, and they make all the difference between the sound of the violin or of the piano, the voice of one friend and that of another.

The great interest of music written for various instruments and for various kinds of voices consists in the endless variety that we are able to get by using one instrument with another kind of instrument which has different overtones. Whatever the instrument employed, we desire that its overtones shall be many and rich and harmonious. This is most notably true in the case of the violin and the human voice.

We all know that some violins made many years ago are worth thousands of dollars, while others may be worth as many cents, because, no matter whether we have the same player, the same bow and the same strings in the two cases, the one violin will make a rich, lovely musical tone and the other a thin, scratchy noise which would hardly be called music. All this is a question of overtones. Somehow or other, one and the same string, played by the same bow, by the same hand, in the same room, produces lovely tones or ugly tones in the two cases, though the name of the note is the same.

THE SECRET OF THE WONDERFUL VIOLINS OF OLDEN DAYS

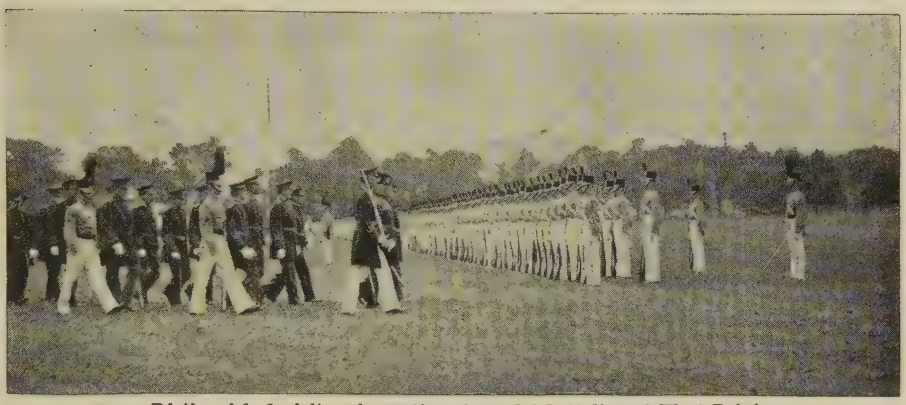
There is something, then, about the body of the violin which makes all the difference, and this is now understood. The string is making not only the big main wave itself, but also the little waves. The secret of making the sound lovely is to have near the string something which can be made to vibrate when the string does, and it must be something which has the power of picking out from the string-waves just those overtones which the ear likes best; then the tone will be enriched. In the wonderful violins of old days the front and the back of the body seem to be made of exactly such size and shape, curvature and thickness, that they both resonate in just the same way and to just the same notes. They help each other instead of fighting each other. Now we may be able to understand why some old instruments are so highly prized.

SOME OF THE GREATEST MAKERS OF VIOLINS

The greatest of the old makers of violins were Italians who worked at Brescia, Cremona, Venice and Naples. Andrea Amati, of Cremona, who died in 1650, made many good instruments, but was surpassed by his sons Antonio and Geronimo, and his grandson Nicolo, who was the greatest of the family. The last-named took many pupils, but his favorite was Antonio Stradivari, to whom he left his tools, models, and all his stock of choice wood. This artist is called the greatest of all makers of violins. He did his best work between 1700 and 1720, and one of his fine instruments will bring thousands of dollars. He had two sons who also made excellent instruments. Antonio Giuseppe Guarneri, who was a young man while Stradivari was at his best, made violins which some think are equal to those of Stradivari.

At Venice, Francesco Gobetti and Domenico Montagnana made beautiful instruments, and Ferdinando Gagliano, of Naples, was the most noted of a large family of violin-makers. Men in other Italian cities, and a few from Northern Europe, learned from the masters at one or other of the four towns. The most famous German was Jacob Stainer, a pupil of Nicolo Amati. French and English violins of the time are not considered equal to the Italian.

THE NEXT STORY OF THE EARTH IS ON PAGE 6851.



Distinguished visitors inspecting the cadet battalion at West Point.

WEST POINT AND ANNAPOLIS

CONTINUED FROM 6622

YOU have all heard a great deal about generals and admirals and lesser officers. Perhaps you have read that some of them had had something to do with West Point or Annapolis. Possibly you have wondered what connection these places have with soldiers and sailors, and have wished to know what and where they are, and what goes on there.

They are two towns, the first in New York and the second in Maryland, and two famous government schools to train officers for the army and navy are situated in them. The United States Military Academy is at West Point, and the United States Naval Academy is at Annapolis. Few people ever use the whole name in speaking of either of these schools, but use instead the name of the town where it is situated, and we shall follow their example, after telling a little about the settlement of West Point itself.

WEST POINT IMPORTANT IN REVOLUTIONARY TIMES

At the beginning of the Revolution Congress decided to fortify the Hudson River, so that the British could not separate New England from the other states by getting control of the river. Fifty miles above New York the river breaks through the Highlands in a winding gap, and on the right, or west, bank the land juts out in a point, and from this comes the name. Here several fortifications were built. It was these fortifications that Benedict Arnold intended to betray to the British, who did not seem to be able to take them by force. After Arnold's treason the name was changed to Fort Clinton. At the end of the Revolutionary War the entire American army of eighty men was stationed here and all military supplies were collected at the fort.

When Washington became president he wished to establish a training school for officers, but very little was done. After Jefferson became president ten cadets of engineers were appointed, in 1802, and forty more the next year, but they did not get much attention. Not until 1812 was the school really put on a firm basis. Then two hundred and fifty cadets were appointed.

We cannot tell of all the gallant young graduates who served in the Mexican War. Grant, Lee, Sherman, Hancock, Thomas, Meade, Stonewall Jackson, Albert Sidney Johnston,

Joseph E. Johnston and many others who later won fame in the Civil War, were all graduates of West Point and served first in the Mexican War or in the Indian wars. Most of the higher officers of the United States Army were trained at West Point, but not all.

But we cannot stop to tell more of old West Point, as there is so much to tell of the new. At the time of the Spanish-American War the army was increased, and it was seen that West Point must be enlarged. The best of the old buildings were kept, and many new ones were built. They make an imposing appearance as we go up the hill from the river.

How cadets receive appointments to the academy

Let us see what the school is like. Under the present law there are, when all vacancies are filled, more than thirteen hundred cadets. Two may be appointed by each Member of the House of Representatives, two by each Senator, two are appointed from Hawaii, Alaska and Porto Rico, four from the District of Columbia, and four from the Philippines. The President selects sixty, very often the sons of army or navy officers; the Vice-president chooses two; twenty are appointed from the graduates of certain military schools, and one hundred and eighty from the regular army and the national guard together. As any one of these graduates, drops out or resigns, another is appointed in his stead. Many of these young men are appointed by competitive examinations. Congressmen are not required to hold such examinations, but they usually do.

No one can be admitted who is under seventeen or more than twenty-two years of age. He must be at least five feet, four inches tall, when seventeen, and five feet, five inches if older. He must have no disease or deformity, and must be strong and vigorous. His eyes, ears and teeth must be good, and he must not be color-blind.

What a cadet must study during the course

When a young man has received an appointment he is ordered to report in June. Certificates from some schools are accepted, but examinations are required for many. If the young man is admitted, he becomes a "plebe." All summer he is drilled, first while living in the barracks and then in summer camp in tents. In September all the cadets move back to the barracks, and regular recitations begin. The course lasts four years and is very hard. There is a great deal of mathematics, besides physics, engineering, science, French and Spanish, law, English, history and drawing. The cadet must study drill regulations, ordnance and gunnery, and other things which a soldier must know. He must go to the gymnasium, and must learn to swim and to ride. Every day is full of its duties, and yet no students have a better time than the West Point cadets.

The cost is all paid by the government. Every year $1,072 is credited to each cadet, and the cost of everything he eats, wears and uses is charged to him. The cadets all eat together in the Mess Hall. At the end of two years, if his record is clear, a cadet has a vacation, or "furlough," for the summer, and may visit his home. The other summers are spent in camp, where there are no lessons from books, but much drill, riding and practical work in engineering is done during the summer encampment.

Methods of teaching and standards of scholarship

Everything is done under strict military discipline. The superintendent is an army officer of high rank, and other officers are assigned to duty here. Cadets always wear uniform, and march to the door of the recitation room under charge of one of their number. In the room the instructor, usually an army officer, has charge. Sections are small, never more than fifteen and usually smaller. A student is called upon to recite nearly every day. No excuses are accepted for poor recitations, and marks are posted every week. A student is expected to spend about two hours in preparing his lesson in a hard subject, and if he fails in one of these subjects, he either is dropped from the Academy or is turned back to the next class, losing a whole year.

Misconduct of any sort is not permitted. If a young man is not respectful to his officers, is late, or does not keep his uniform, his gun or his room clean, he is punished by being given extra duty or by loss of privilege. If he is reported too often, he is suspended or dismissed. A charming story of life at West Point before the Spanish-American War is Cadet Days, by Captain Charles King.

WHAT THE CADETS LEARN THAT IS NOT IN BOOKS

So his life goes on through the four years. He learns many things. The cadets do everything that the regular army men do, and they are commanded by cadet officers. These officers are much envied, as they are chosen from the cadets of highest standing. The cadet is taught that no man is fit to command who has not learned to obey. He is taught how to study, and he gains an almost perfect body.

Then when he finally gets his diploma he is commissioned a second lieutenant in the United States Army, and begins his work as a leader of men. Those who have the highest record for studies and conduct are allowed to choose the branch of the service they prefer, as engineers, artillery, cavalry or infantry. The men of highest rank usually choose the engineers, but not always. Wherever they go their standing in class helps them, for the men of high rank are promoted first.

The West Academic Building at West Point is one of the two in which most recitations are held. It was built in 1895, and is a successful example of fitting a new building into old surroundings. It looks as if it had been standing as long as any of the others. The East Academic is just opposite.

WHERE THE OFFICERS OF THE NAVY ARE TRAINED

A hundred years ago boys who wished to become naval officers got appointments as midshipmen if they could, and were sent aboard one or another of the war vessels to carry messages for the officers. They were only boys, and no one looked after them very much unless they got into mischief. Then they were severely punished. Under these conditions a few became good sailors and officers, but the thoughtless and careless did not learn much, and often formed bad habits.

Later several schoolmasters were appointed to the ships, but sometimes the captains did not believe in the idea, and there were many interruptions to the teaching. Some of the officers favored a real naval school, and Matthew F. Maury, a distinguished officer, wrote so much upon the subject that he has been called the "Father of the Naval Academy." Finally the famous historian George Bancroft became Secretary of the Navy, and he determined to found a school to train officers.

Congress had not given any money for this purpose, but there was an abandoned fort at Annapolis, Maryland. The War Department turned over Fort Severn and nine acres of land to the Navy Department, and here in October, 1845, the Naval School was opened with three instructors and fifty midshipmen. The course of study was to be five years, of which the first and fifth were to be spent

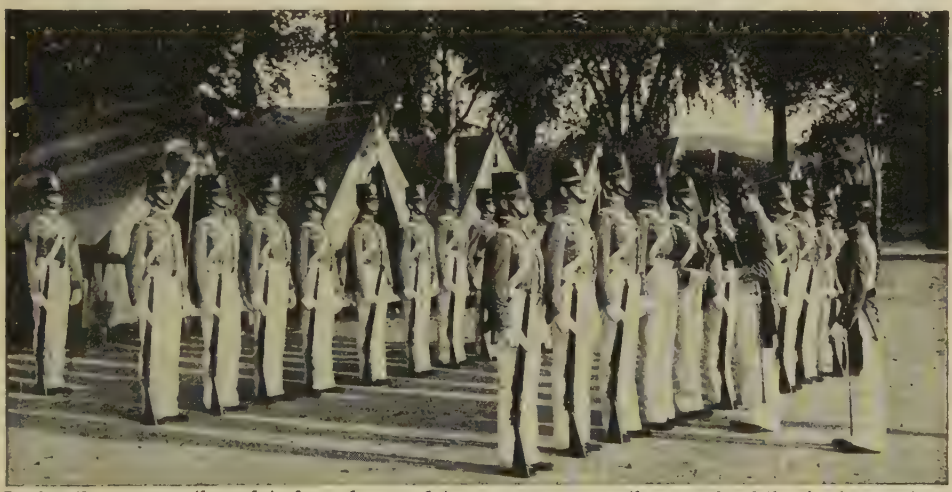
IN SIGHT OF THE BEAUTIFUL HUDSON

The buildings of the United States Military Academy at West Point, New York, are imposing. Here is a view of a small part of them taken from the roof of another building. The river beyond is the Hudson, at the point where it breaks through a gap in the Highlands. Since 1902 many new buildings have been erected, making room for many more cadets than formerly. The views around the Academy are superb.

The reservation around the Academy, including Constitution Island in the river, which also belongs to the United States, amounts to about five and a half square miles. The parade ground is large enough for the exercise of a considerable body of troops. Here we see the cadets on parade, watched by many interested spectators. The cadets are famed for the accuracy and precision with which they drill.

SUMMER WORK AT WEST POINT

Cadets at West Point are drilled as infantry, artillery and cavalry. Here you see a group engaged as light artillery. The gun is being put together, and the horses are ready to draw it to the proper place.



During the summer, the cadets formerly moved to summer camp on the grounds of the Academy, where they lived in tents. Now some classes are sent to regular army posts for summer drill. Here "inspection" is going on. The cadet officer is examining the guns and equipment, seeking to find a speck of dirt. The cadets here are in the dress summer uniform, worn only on special occasions. Such caps and coats were worn by the whole army years ago, but have long since been discarded for the khaki.

Every West Point cadet must be able to ride any horse he is likely to find in the army. Here is cavalry drill on the ample grounds of the Academy. Lessons in riding are given indoors in the great riding-hall.

HOW A WEST POINT CADET LEARNS

When a cadet has finished his problem he turns toward the instructor and stands at attention until called upon to recite. Then he turns to the blackboard and explains his work. If his work is correct and his explanation full and clear he receives a high mark, but if the instructor must ask a question to make the explanation clear, a deduction is made, even if the work is correct. The instructors are chiefly officers.

Two cadets are assigned to a room, which they must keep in order themselves. Everything must be in its proper place, and neither must use the other's things. The beds must be left exactly as the rule requires. The regulations fix exactly the place where towels, soiled clothes, and even whisk-brooms must be kept. No litter is allowed, and each cadet must post his schedule showing where he may be found.

CHAPEL AND BANCROFT HALL, ANNAPOLIS

The impressive new chapel at Annapolis. The body of Paul Jones has been brought from Paris, where it had been lying in an unmarked grave, and is now in the Crypt of this building, a fitting tomb.

The United States Naval Academy at Annapolis, Maryland, was founded in 1845 as a school to train naval officers, and received its present name in 1850. Since about 1900 many new buildings have been constructed, and now it is the most complete naval school in the world. This is only a part of Bancroft Hall, the immense building used as a dormitory for the midshipmen. The building was named in honor of George Bancroft, the historian, who was Secretary of the Navy when the Academy was organized.

at school and the other three on board ship. The name was changed to the United States Naval Academy in 1850, and the time spent at school became four years. Soon the old Constitution was given as a training ship.

At the beginning of the Civil War it was feared that Annapolis was too far south to be safe from Confederate attack, and the school was moved to Newport, Rhode Island, in 1861, and did not return to Annapolis until 1865.

After the Civil War the navy of the United States was neglected, and little attention was paid to the Academy.

From this air view of Annapolis you can get a general idea of the plan of our Naval Academy. Beyond the drill grounds and athletic fields lie the principal buildings. The dome of the chapel, in whose crypt is the mausoleum of John Paul Jones, can be seen plainly. Trees screen some of the main halls; but far to the left stand out MacDonough Hall and Luce Hall. To the north of the latter is Dewey Basin.

There were not places in the navy for all the graduates, and they were encouraged to resign. Later greater interest was taken in the navy, many new vessels were built, and more officers were needed. After the Spanish-American War magnificent new buildings were constructed. Now the Academy has better buildings than any other naval school in the world.

Much land has been bought since 1865, and the grounds are quite extensive. Of the new buildings the largest is Bancroft Hall, where the midshipmen live. On one side is MacDonough Hall, the gymnasium, and on the other is Dahlgren Hall, the armory. East of the gymnasium is Luce Hall, the seamanship building. Behind Bancroft Hall is the Academic Group, consisting of Mahan Hall, Maury Hall and Sampson Hall, all named for distinguished officers. Isherwood Hall is behind these, with the Chapel and the officers' residences to the south.

The midshipmen are appointed very much like the cadets at West Point. Under the present law each Senator, Representative and Territorial Delegate is allowed to appoint three, and as one is graduated, resigns or is dropped, he may fill his place. Two are allowed to the District of Columbia, one to Porto Rico and four to the Philippines. The President may appoint fifteen each year, and one hundred each year may be appointed from the Navy or the Marine Corps.

The newly appointed midshipman may take his examinations for entrance at many places throughout the country. Certificates from some schools are accepted. If he passes, he reports at Annapolis in June for his physical examination. This examination is even more strict than the examination for West Point. If he is admitted he also becomes a "plebe," and the summer is spent in drill, in gunnery, gymnastics and in the use and management of boats.

Regular work begins in the fall. The course, like that at West Point, is four years. It requires a great deal of sev-

WORK AND PLAY AT ANNAPOLIS

This is another view of Bancroft Hall, the quarters of the midshipmen, taken in the summer while all of the midshipmen, except the fourth, or entering class, were away on the annual practice cruise. It looks out on the water. Luce Hall is on one side and Dahlgren Hall, which is shown below, is on the other.

The midshipmen always have a good football team, and frequently play with college teams. The building on the right is Dahlgren Hall, and beyond is the Chapel. On the left is Porter Road, where many officers who teach in the Academy live. Luce Hall, the gymnasium, resembles Dahlgren Hall in architecture.

This is the Academic Group, with midshipmen marching to and from recitations. The building in the centre is Mahan Hall. Maury Hall is to the right, and the building on the left is Sampson Hall. Here are most of the recitation rooms, though some special subjects are taught in other buildings. Dewey Basin, where the ships lie, is to the right of the picture, near the Power House.

First and second pictures by Brown Bros.; third by Underwood & Underwood, New York.

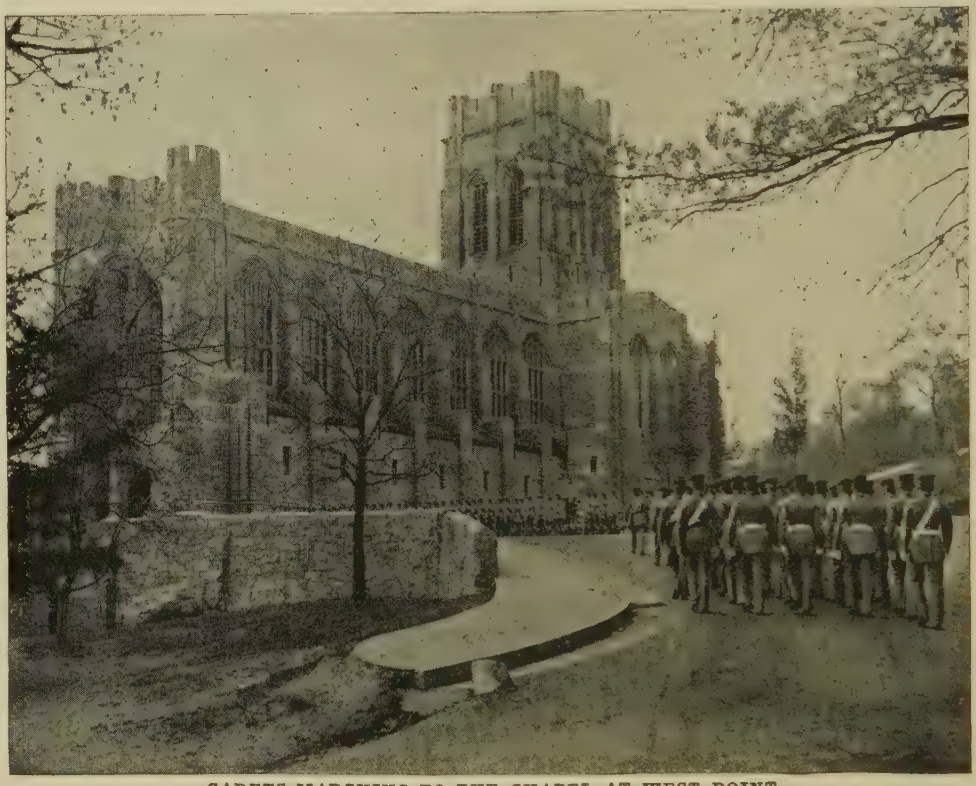
eral branches of mathematics, drawing, chemistry and physics, for a modern battleship is a complicated mass of machinery. The midshipman must also study English, history, Spanish and French. Some of the instructors are naval officers, while others are civilians. The superintendent is a naval officer of high rank.

The discipline is much like that at West Point—very strict, but fair; and the midshipmen have a good time. They drill also, but their uniforms are blue, instead of gray as they are at West Point. Every summer all classes go for three months on a practice cruise on warships, and then have a month's leave, during which they may visit their homes. Just as at West Point, the expenses of the cadets are paid by the government.

Much attention is given to athletics, particularly football; and both the academies have excellent teams. Both play with college teams, but the great game of the year is the one they play with each other. The Army-Navy game is attended by thousands of spectators. Very often the President, members of the Cabinet and other high officials of the government are present. Of course all the army and naval officers attend who can possibly do so.

When the midshipmen are graduated they are commissioned ensigns in the United States Navy or officers in the Marine Corps, and assigned to duty wherever they are needed. As in the army, high rank at Annapolis helps to gain earlier promotion in the navy, and the higher men may be lieutenants while the lower men are still ensigns.

Such are the two great schools to train American officers. They are open to any American boy who can get an appointment, and generally the Members of Congress hold examinations and give the appointments to those who stand highest. When they enter the schools it does not matter whether their fathers are rich or poor, distinguished or unknown. Very often the cadets who stand highest and are most liked come from humble surroundings.



CADETS MARCHING TO THE CHAPEL AT WEST POINT

THE NEXT STORY OF THE UNITED STATES IS ON PAGE 6825.

Photo, Ewing Galloway. Church of the Sorbonne, Paris.

THE LITERATURE OF FRANCE

PART II

CONTINUED FROM 6505

THE seventeenth century is always known as the classic century of French literature. It is not often that the beginnings of a literary epoch correspond to dates in history, but it does happen that for once the beginnings of the seventeenth century coincide almost exactly with a revolution in French literature. This was due largely to the influence of the poet Malherbe, who made reason and common sense the standards of the century. Two institutions upheld these standards, the Hôtel de Rambouillet, where the Marquise de Rambouillet brought together the cultivated society of Paris, and thus exercised a great influence on literature, and the Académie française, which, starting as a private society of scholars, was transformed by Richelieu in 1635 into a state corporation. The Academicians published a dictionary of the language.

Besides these institutions, there was a great critic, Boileau, whose reputation became so great that his verdict could make and unmake authors. In his *Art poétique* (Poetic Art) and *Epîtres* (Letters) he set forth the rules of literature. To disobey them was to be condemned. He took the side of the classic writers, and we might call the seventeenth century, from its obedience to the rules of the classicists, the century of authority. His famous poem Poetic Art thus begins:

Rash author, 'tis a vain presumptuous crime
To undertake the sacred art of rime;
If at thy birth the stars that ruled thy sense
Shone not with a poetic influence,
In thy strait genius thou wilt still be bound,
Find Phœbus deaf, and Pegasus unsound.
You, then, that burn with a desire to try
The dangerous course of charming poetry,
Forbear in fruitless verse to lose your time,
Or take for genius the desire of rime;
Fear the allurements of a specious bait,
And well consider your own force and weight.

Nature abounds in wits of every kind,
And for each author can a talent find;
But authors that themselves too much esteem,
Lose their own genius, and mistake their theme.

All the great authors show the influence of this obedience. Pierre Corneille, in his great tragedies *Le Cid, Horace, Cinna, Polyeucte,* almost slavishly follows the ancient models. Racine, imitating the Greek dramatists in his *Andromaque, Phèdre, Iphigénie, Bérénice,* and *Britannicus,* exhibits the same submission.

We might call Molière an exception to this. Instead of accepting the standards and models of the age, Jean

Baptiste Poquelin (Molière's real name) ridicules the affectations of society in his comedies, *Les Précieuses ridicules* (Ridiculous Pedants), *Les Femmes savantes* (Learned Women), *Le bourgeois Gentilhomme* (The Middle-class Nobleman). He pokes fun at the false learning of scholars in *L'Amour médecin* (Doctor Love), *Le Médecin malgré lui* (The Doctor in Spite of Himself), *Le Malade imaginaire* (The Imaginary Invalid). He scorns the hypocrites in *Tartufe* and *Don Juan;* the miser and the selfish man in *L'Avare* (The Miser) and *Le Misanthrope* (The Egoist).

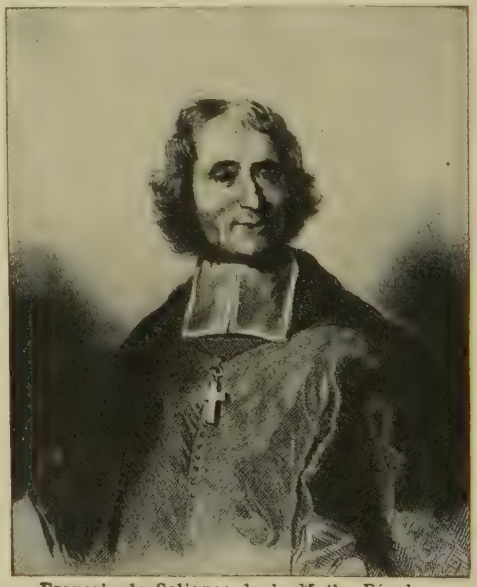
Sir Walter Scott called Molière "the prince certainly of comic writers," and said that in the degree superior to all other men he had "the falcon's piercing eye to detect vice under every veil, or folly in every shape, and the talent to pounce upon either as the natural prey of the satirist." He was born in 1622, the son of an upholsterer who became attached to the court. Molière himself might have become a lackey of the king of France if a love for theatricals had not carried him into the provinces as an actor. He was seized with convulsions when playing the part of the Imaginary Invalid and died soon afterward, when he was only fifty-one.

La Fontaine is a writer of marked originality. In his charming fables and *contes* he stands for a renewal of the old French spirit as it had shown itself in the *fabliaux* and beast-epics. Though his model is often the classic Æsop fable, his own individuality is strongly stamped on each story.

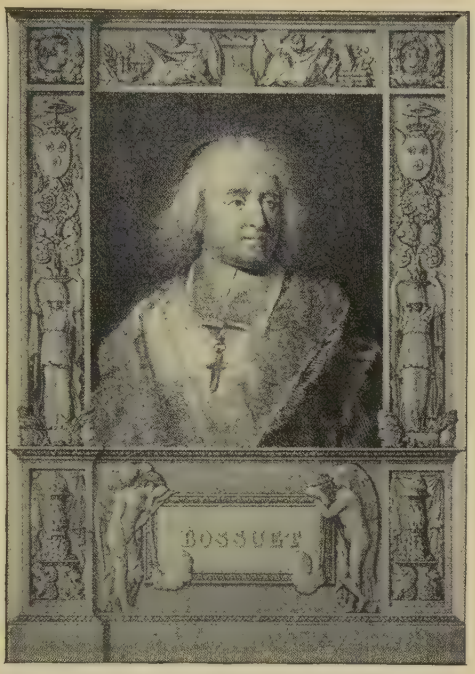
He was the son of a superintendent of woods and forests, and was born in 1621. Invited to Paris by the Duchesse de Bouillon, a leader of a famous salon, he was very soon intimate with Molière, Boileau, Racine and other contemporary celebrities. He was made a member of the French Academy in 1683, but not without some opposition from Louis XVI, with whom he was never a favorite. He died in Paris in 1695. His Fables appeared between 1688 and 1694. The first six were inscribed to the Dauphin of France. Several examples of these can be found in the Book of Poetry. We give here one that is often quoted:

THE LION GOING TO WAR

The lion had an enterprise in hand;
Held a war council, sent his provost marshal,
And gave the animals a call impartial,—
Each, in his way, to serve his high command.
The elephant should carry on his back
The tools of war, the mighty public pack,
And fight in elephantine way and form;
The bear should hold himself prepared to storm;
The fox all secret stratagems should fix;
The monkey should amuse the foe by tricks.
"Dismiss," said one, "the blockhead asses,
And hares, too cowardly and fleet."



François de Salignac de la Mothe Fénelon.



"No," said the king: "I use all classes;
Without their aid my force were incomplete.
The ass shall be our trumpeter, to scare
Our enemy. And then the nimble hare
Our royal bulletins shall homeward bear."

A monarch provident and wise
Will hold his subjects all of consequence,
And know in each what talent lies.
There's nothing useless to a man of sense.

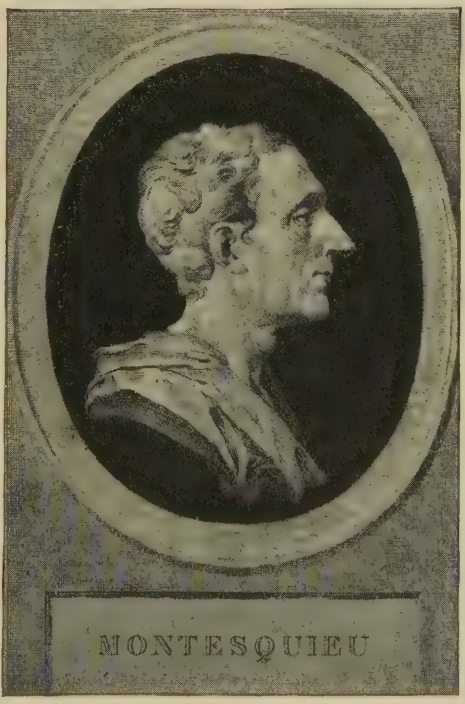
The philosopher Descartes refused to accept the traditional theory of existence. He invented a theory of his own, resting on the proposition "*Je pense, donc je suis* (I think, therefore I am)." Thus he sowed the seeds of rational thinking which in time was to prove fatal to the authority of the Church. His chief writings are *Discours de la méthode* (Discourse on Method), *Méditations philosophiques* (Philosophical Meditations) and *Traité des passions de l'âme* (A Treatise on the Feelings of the Soul).

This short example explaining the origin of tears gives us a good example of his clear thinking and writing.

As laughter is never caused by the greatest joys, so tears do not come from an extreme sadness, but only from that which is moderate, and accompanied or followed by some sentiment of love, or even of joy. And to understand their origin well, it must be observed that although a quantity of vapors continually depart from all portions of our bodies, there is none whence they depart so much as from the eye, because of the large size of the optic nerves and the multitude of little arteries by which they reach there; and that as the perspiration is composed only of vapors which, leaving other parts, convert themselves into water on the surface, so tears are made of vapors which leave the eyes.

Few men eminent in French literature are so extraordinarily interesting as Blaise Pascal. Born in 1623, the son of a devoted father who gave up everything to educate his precious child, he was an advanced mathematician at twelve and a theologian at sixteen. At one moment leading the army of science by the brilliant daring of his speculations, he was at the next in the forefront of the religious battle, passionately declaiming the truth of God. The most popular of Pascal's books is the volume called *Pensées* (Thoughts); and so beautiful is the style and so eternal is the matter, for they deal with God and the soul, that they can be read to-day with the fullest enjoyment. He wrote also *Lettres provinciales* (Provincial Letters), a caustic satire on the Jesuits. Pascal died in his fortieth year, and afterward the doctors discovered he had a brain of amazing size and density.

The short excerpt from his Thoughts may bring us into touch with him a little:



Nicholas Boileau.

We care nothing for the present. We anticipate the future as too slow in coming, as if we could make it move faster; or we call back the past, to stop its rapid flight. So imprudent are we that we wander through the times in which we have no part, unthinking of that which alone is ours; so frivolous are we that we dream of the days which are not, and pass without reflections those which alone exist. For the present generally gives us pain; we conceal it from sight because it afflicts us, and if it be pleasant we regret to see it vanish away. We endeavor to sustain the present by the future and think of arranging things not in our power, for a time at which we have no certainty of arriving.

If we examine our thoughts we shall find them always occupied with the past or the future. We scarcely think of the present, and if we do so, it is only that we may borrow light from it to direct the future. The present is never our end; the past and the present are our means, the future alone is our end. Thus we never live, but hope to live, and while we always lay ourselves out to be happy, it is inevitable that we can never be so.

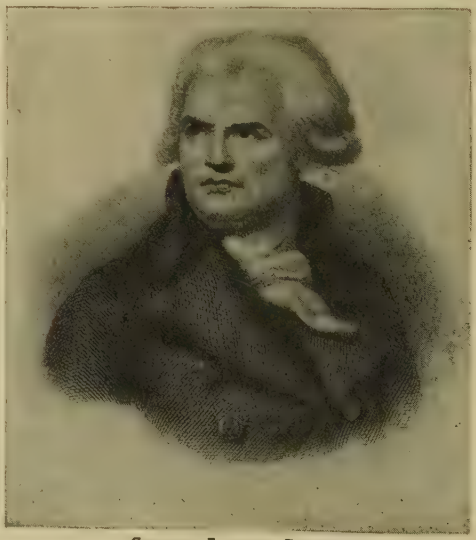
There are other moralists of the period: La Bruyère, author of *Les Caractères* (Characters); La Rochefoucauld, who wrote *Maximes* (Maxims); and Madame de Maintenon.

Charles Perrault is the author of the naïve and humorous fairy tales which the French call *contes*.

In the Church the strife between authority and liberty is shown by the writings of two brilliant men—Bossuet, "the eagle of Meaux," on the side of authority, and Fénelon, "the swan of Cambrai," on the side of liberty. Bossuet believed that the Church was the everlasting master of man's soul, and the king of France the master of all French royalties. He attacked Protestants with tremendous power. He attacked mystics like the great Fénelon. His splendid *Oraisons funèbres* (Funeral Orations) are famous for their power; in his Sermons and *Discours sur l'histoire universelle* (Discourse on Universal History) he glorifies God in sonorous eloquence.

Fénelon's *Voyage de Télémaque* (Telemachus' Voyage), written for his royal pupil the Dauphin, suggested rules of government that were not appreciated by the autocratic Louis XIV, particularly the "great and holy maxim that kings exist for the sake of their subjects, not subjects for the sake of kings." He wrote a treatise on the education of girls, which was the first attempt to deal with the subject. For his *Essais sur les maximes des saints* (Maxims of the Saints). Bossuet took him to task, referred the thesis to Rome and finally secured its condemnation. Fénelon was thereupon banished from court, and left his diocese only once during the remaining eighteen years of his life.

At the opening of the eighteenth century we have Bayle, the scholarly and bold author of a great dictionary of history. He was a forerunner of the Revolution and of Voltaire in his attacks upon the beliefs of the day. Voltaire might be



Georges Jacques Danton.

Rouget de Lisle.

called the "morning star" of the Revolution, so timely was his appearance with regard to that great upheaval. His standard was plain common sense and from this stronghold he proceeded to attack existing traditions and beliefs—particularly the standing of the Catholic Church. He had the advantage of a clear and beautiful style, and his many-sided interests caused him to be called the father of French journalism.

Then we come to the important group of Encyclopedists. Diderot, a brilliant and profound writer, made *L'Encyclopédie* (the Encyclopedia), the work of his life. He enrolled the most distinguished writers of the time as helpers, among them D'Alembert, who wrote the *Discours préliminaire* (Preliminary Discourse), Nably, Raynal, Grimm, Helvétius, Holbach and Condillac.

Jean Jacques Rousseau, an eccentric and restless genius, attacked society as a whole, declaring civilization was only another word for slavery, and that to return to nature was to find freedom and peace. His ideas furnished many of the experiments which the Revolution tried to put into practice; indeed his *Contrat social* (Social Contract) has been called the Bible of the Revolution.

THE WATCHMAKER'S SON AND THE PROPHECY WHICH CAME TRUE

Life in France had now come to the breaking-point. Literature and art were the property of courts and salons. They had no contact with the people. Religion was simply a force in the political struggles of the day. In a wave of anguish and indignation the French people rose up from the bed of their suffering and swept away nearly all the landmarks of their history.

Beaumarchais is a figure worth our attention. He was the son of a Paris watchmaker who used the French stage to prepare the way for revolution. With wit and irony, in plays called *Le Barbier de Séville* (The Barber of Seville) and *Le Mariage de Figaro* (The Marriage of Figaro), he showed French people how foolish were the conditions in which they spent their lives and how ridiculous were the pretensions of those who kept them in servitude. "I am a citizen," he wrote in his Memoirs, "that is, something entirely new, utterly unknown and unheard of in France. I am a citizen—that is, what you should have been two centuries since, what you may be perhaps twenty years from now." This was written in 1774. It was a prophecy which came true.

On the other hand, there were people in France who hated philosophy, who

Maximilian Marie Isidore Robespierre.

François Marie Arouet Voltaire.

disliked the cold influence of science, and who cherished the ancient traditions of literature as an amusement, even as a dope. For these people, as the warlike century drew to its bloodstained end, a friend of Rousseau named Bernardin wrote the famous tale of *Paul et Virginie*. The story is foolish enough, but it is full of lavish description of tropical scenes, it is saturated with romance, and it leaves the door open for anything to happen. Bernardin was hailed as a genius, and French literature might have followed him into a wilderness of absurdity but for the political tempest which scattered all such pages, like the dried leaves of autumn, far away from the business of human life.

THE STORMY DAYS OF FRANCE WHEN LITERATURE WAS BANISHED

In that great tempest literature was able to raise its voice above the storm only for a moment. Rouget de Lisle wrote the words and music of *La Marseillaise* in 1792, and it became one of the greatest marching songs in the history of the human spirit. But the Revolution closed the doors of the salons and banished literature from the stormy life of France. The library seemed to crash with the throne, while journalism, with a Cap of Liberty on its head, made a pulpit for itself on the barricades. Nothing gracious survives of that period except Joubert's *Pensées* (Thoughts), published after his death in 1824. Joubert was a delicate, scholarly spirit who hated Voltaire and clung to Plato.

But a great name emerges from the storm in Châteaubriand, who passed from a pensive atheism to a pensive Christianity, and wrote *Le Génie du christianisme* (The Genius of Christianity), which taught art that it cannot exist without religion and awoke anew the feeling for nature. His was the first voice raised in France to recall men from the folly of expecting satisfaction from economics. It was not a great voice, and nothing that he said is of much importance now; but it was a voice to which men listened, a voice gratefully heard even by the greatest of all French writers, Victor Hugo.

Of all thinkers at the dawn of the nineteenth century the most original and powerful was Auguste Comte, the father of positivism. Men, he said, begin by fighting and believing in tribal gods; they move forward to an attempt to explain the mysteries of the world by tracing cause and effect; finally, they advance to the knowledge that the human brain can never grasp the ultimate mystery of the universe, and set themselves humbly and tranquilly to enjoy the fruits of industrialism. To know that the brain is finite, that truth must always elude it

Alexander Dumas.

—this is positivism. Instead of a God they cannot possibly understand, men should reverence humanity—the great thinkers, the pure mothers, the unselfish sisters, the strong brothers, to whom we owe the higher life of civilization.

THE POETS WHO WANTED CHRISTIANITY BUT DID HARM TO ITS CAUSE

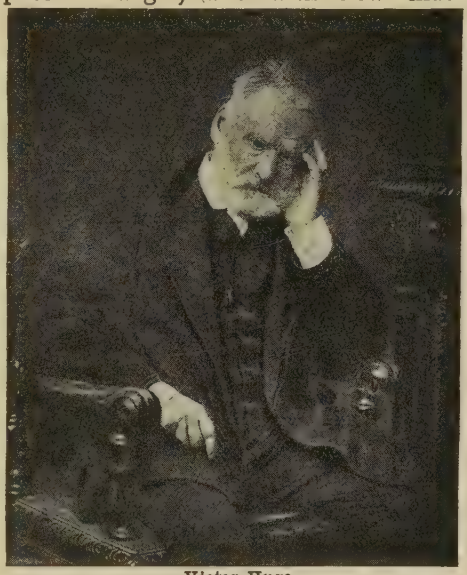
But this was not a food on which the soul of man could long feed with satisfaction. A revolt soon came. "I will be Châteaubriand or nothing," wrote the boy Victor Hugo; and Lamennais, whose motto was "God and Liberty," strove to make the Roman Church democratic, so that all men might worship God without violence to their intellect. A body of romantic poets came into existence, wanting Christianity, wanting a monarchy, and asserting an egoism which was fatal to both. Lamartine was the purest product of this school, with his *Méditations poétiques* (Poetic Meditations) and *Harmonies poétiques et religieuses* (Poetic and Religious Harmonies). Gautier was a picturesque figure of that time, using glittering words to hang on a delicate string, saying nothing in particular, but saying it with so much authority that he was regarded by long-haired young men as the high priest of a new literature, and the unconquerable champion of art for art's sake.

Across these soft flutings broke suddenly the strident but homely twang of a banjo. Béranger began to sing. He looked for no fine words, but deliberately took his vocabulary from the street where the common people live. All France was soon singing his songs, which in a humble way helped her back to peace and good humor. But Béranger lost his balance, forgot he was a rhyming journalist, imagined he was a poet of eternity, and in this way became ridiculous. We give you two stanzas of one of his songs—The Gadfly:

In the midst of our laughter and singing,
'Mid the clink of our glasses so gay,
What gadfly is over us winging,
That returns when we drive him away?
'Tis some god. Yes, I have a suspicion,
Of our happiness jealous, he's come:
Let us drive him away to perdition,
That he bore us no more with his hum.

Transformed to a gadfly unseemly,
I am certain that we must have here
Old Reason, the grumbler, extremely
Annoyed by our joy and our cheer.
He tells us in tones of monition
Of the clouds and the tempests to come:
Let us drive him away to perdition,
That he bore us no more with his hum.

His place was soon taken. One of the greatest writers in the world now made his appearance on the soil of France—Victor Hugo; and French literature, newborn from the fires of the Revolution, became a splendid thing. How splendid only those can judge who fully know the impassioned poetry, the magnificent journalism and the immortal novels of this fervid spirit; this exiled patriot, himself no noble figure; himself, like poor Béranger, but with how much



Victor Hugo.

greater excuse, the victim of a dwarfing egoism whose imagination fills us with wonder and affection.

We give you here an extract from his Ninety-three. The scene is aboard ship and a frightful thing had just happened. One of the battery guns, a 24-pounder weakly attached, had broken loose and was turning the ship into a scene of horror. Hurled forward by the pitching of the deck, first the gun dashed into a group of gunners and killed five of them. Then it shattered four other pieces, and dug two crevices in the side. The sailors threw down everything they could into the path of the gun, but nothing availed, and the devastation increased. Each bound of the liberated gun threatened the destruction of the vessel. A few minutes more and shipwreck would be inevitable.

Suddenly, into the midst of this sort of inaccessible circus, where the escaped cannon leaped and bounded, there sprang a man with an iron bar in his hand. It was the author of this catastrophe,—the gunner whose culpable negligence had caused the accident; the captain of the gun. Having been the means of bringing about the misfortune, he desired to repair it. He had caught up a handspike in one fist, a tiller rope with a slipping noose in the other, and jumped down into the gun deck.

Then a strange combat began, a Titanic strife—the struggle of the gun against the gunner; a battle between matter and intelligence; a duel between the inanimate and the human.

The man was posted in an angle, the bar and rope in his two fists; backed against one of the riders, settled firmly on his legs as on two pillars of steel, livid, calm, tragic, rooted as it were in the planks, he waited.

He waited for the cannon to pass near him.

The gunner knew his piece, and it seemed to him that she must recognize her master. He had lived a long while with her. How many times he had thrust his hand between her jaws! It was his tame monster. He began to address it as he might have done his dog.

"Come!" said he. Perhaps he loved it.

He seemed to wish that it would turn toward him.

But to come toward him would be to spring upon him. Then he would be lost. How to avoid its crush? There was the question. All stared in terrified silence.

Not a breast respired freely, except perchance that of the old man who alone stood in the deck with the two combatants, a stern second.

He might himself be crushed by the piece. He did not stir.

Beneath them the blind sea directed the battle.

At the instant when, accepting the awful hand-to-hand contest, the gunner approached to challenge the cannon, some chance fluctuation of the waves kept it for the moment immovable as if suddenly stupefied.

"Come on!" the man said to it. It seemed to listen.

Suddenly it darted upon him. The gunner avoided the shock.

The struggle began,—struggle unheard of. The fragile matching itself against the invulnerable. The thing of flesh attacking the brazen brute. On the one side blind force, on the other a soul.

The whole passed in a half light. It was like the indistinct vision of a miracle.

A soul,—strange thing; but you would have said that the cannon had one also,—a soul filled with rage and hatred. This blindness appeared to have eyes. The monster had the air of watching the man. There was—one might have fancied so at least—cunning in this mass. It also chose its moment. It became some gigantic insect of metal, having or seeming to have, the will of a demon. Sometimes this colossal grasshopper would strike the low ceiling of the gun deck, then fall back on its four wheels like a tiger upon its four claws, and dart anew on the man. He, supple, agile, adroit, would glide away like a snake from the reach of these lightning-like movements. He avoided the encounters; but the blows which he escaped fell upon the vessel and continued the havoc.

An end of broken chain remained attached to the carronade. This chain had twisted itself, one could not tell how, about the screw of the breech button. One extremity of the chain was fastened to the carriage. The other, hanging loose, whirled wildly about the gun and added to the danger of its blows.

The screw held it like a clenched hand, and the chain, multiplying the strokes of the battering-ram by its strokes of a thong, made a fearful whirlwind about the cannon—a whip of iron in a fist of brass. This chain complicated the battle.

Nevertheless, the man fought. Sometimes, even, it was the man who attacked the cannon. He crept along the side, bar and rope in hand, and the cannon had the air of understanding, and fled as if it perceived a snare. The man pursued it, formidable, fearless.

Such a duel could not last long. The gun seemed suddenly to say to itself, "Come, we must make an end!" and it paused. One felt the approach of the crisis. The cannon, as if in suspense, appeared to have, or had,—because it seemed to all a sentient being,—a furious premeditation. It sprang unexpectedly upon the gunner. He jumped aside, let it pass, and cried out with a laugh. "Try again!" The gun, as if in a fury, broke a carronade to larboard; then, seized anew by the invisible sling which held it, was flung to starboard toward the man, who escaped.

Three carronades gave way under the blows of the gun; then, as if blind and no longer conscious of what it was doing, it turned its back on the man, rolled from the stern to the bow, bruising the stem and making a breach in the plankings of the prow. The gunner had taken refuge at the foot of the stairs, a few steps from the old man, who was watching.

The gunner held his handspike in rest. The cannon seemed to perceive him, and, without taking the trouble to turn itself, backed upon him with the quickness of an ax stroke. The gunner, if driven back against the side, was lost. The crew uttered a simultaneous cry.

But the old passenger, until now immovable, made a spring more rapid than all those wild whirls. He seized a bale of the false assignats, and at the risk of being crushed, succeeded in flinging it between the wheels of the carronade. This maneuver, decisive and dangerous, could not have been executed with more adroitness and precision by a man trained to all the exercises set down in Dunrosel's Manual of Sea Gunnery.

The bale had the effect of a plug. A pebble may stop a log, a tree branch turn an avalanche. The carronade stumbled. The gunner, in his turn, seizing this terrible chance, plunged his iron bar between the spokes of

one of the hind wheels. The cannon was stopped.

It staggered. The man, using the bar as a lever, rocked it to and fro. The heavy mass turned over with a clang like a falling bell, and the gunner, dripping with sweat, rushed forward headlong and passed the slipping noose of the tiller-rope about the bronze neck of the overthrown monster. It was ended. The man had conquered. The ant had subdued the mastodon; the pygmy had taken the thunderbolt prisoner.

THE WRITER WHO BROUGHT NEW LIFE TO THE SOUL OF FRANCE

Victor Hugo brought new life to the literary soul of France. Soon his throne was surrounded by giants: George Sand, who made peasant life a reality in French literature; Honoré de Balzac, who called himself "the Secretary to Society" and created two thousand characters to fill the stage of his *Comédie humaine* (Human Comedy); Prosper Mérimée, Alexandre Dumas, Flaubert, Maupassant, Alphonse Daudet and many others. History, too, took on a grander note and essayed a nobler flight in the works of Thierry and Guizot. Renan introduced a new note into the literature of religion, and Sainte-Beuve a new note into the literature of criticism. After Hugo's day there was a reaction to the small and sordid, but craftsmanship was surer, and French literature still maintains a spell over the soul of Europe, as witness the masterly irony of Anatole France.

Photo, Kadel & Herbert.

Anatole France.

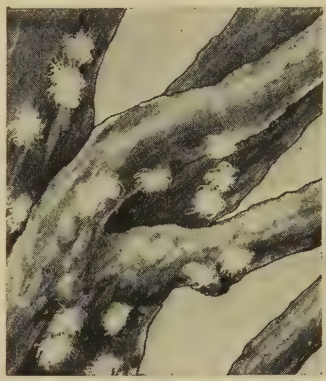
We give here an example of his subtle description, taken from M. Pigeonneau, an eminent Egyptologist who has received the present of a little cat and seems to be falling under its influence.

I settled myself to a chronological work the more interesting to me that I somewhat mishandle in it my eminent confrère, M. Maspero. Porou did not quit my table. Seated on his haunches, his ears pricked up, he watched me write. Incredible thing, I did nothing of worth that day. My ideas were clouded; there came into my mind scraps of songs and fragments of fairy tales. I went to bed very ill satisfied with myself. The next morning I once more found Porou seated on my table, licking his paw. This day again I worked ill; Porou and I passed the chief hours of sunlight gazing at each other. The morrow went past in the same way, and the day after that; in brief, the whole week. I ought to have felt afflicted; but I must confess that little by little I took my misfortune with patience, and even with gayety. The rapidity with which an honest man grows depraved is something appalling. On Epiphany Sunday I rose most joyously and hurried to my table, where Porou according to his wont had preceded me. I took a quire of handsome white paper, dipped my pen in the ink, and wrote in large letters, under the gaze of my new friend "Mischances of a One-eyed Porter." Then, without my eyes quitting Porou's regard, I wrote all day, with a prodigious rapidity, a narrative of adventures so marvelous, so pleasant, so varied, that I was myself enraptured with it. My one-eyed street-porter mistook parcels and committed the most comical blunders. Lovers placed in a critical situation received from him, without its being suspected, unforeseen assistance. He transported clothes-presses with men hidden inside, and these, introduced into a new domicile, frightened the old ladies. But how analyze so merry a tale? Twenty times I burst out laughing while writing it. If Porou did not himself laugh, his grave aspect was as pleasing as the most hilarious of visages.

Still it is true, looking back over the whole field, to say that France has no Shakespeare, no Milton, no Dante, no Goethe. She seems deliberately to have sacrificed her religious hauntings and her Latin imagination to a logic which can never keep abreast of scientific discoveries or the profoundest philosophy, and can certainly never translate the soul of man to the enchanted kingdoms of delight. She is clever, she has moments, too, in which she seems to look upward to the stars; but not for long is she able to maintain herself in that high region where genius breathes the air of greatness.

THE NEXT STORY OF LITERATURE IS ON PAGE 6905.

THE LIFE-STORY OF AN ORCHARD PEST

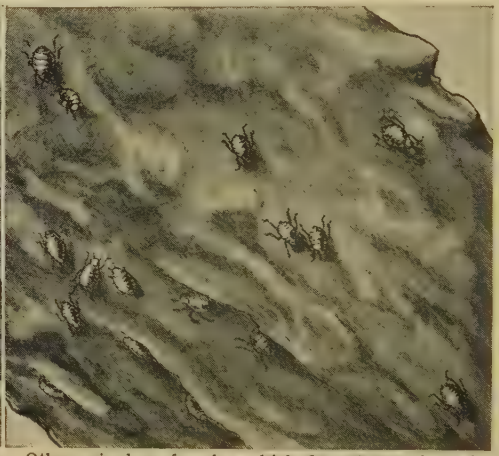


In spring we often see on the bark and leaves of apple trees tufts like cotton wool. Inside these are tiny insects, the wingless females of the woolly aphid or American blight.

The aphids rapidly grow to maturity, producing young at the rate of as many as twenty a day. These also grow and breed, so that there are many generations in a summer.

Late in the summer winged females are hatched, but no one knows why these have wings. These creatures injure the tree by penetrating the tissue and drawing away sap.

As winter approaches, many wingless female aphids migrate from the upper part of the tree to the roots, and cause canker wounds which at last kill the roots.



Other wingless females which do not travel as far as the roots hibernate in cracks and crevices of the diseased bark of the apple tree.

When spring comes the aphids wake up, and those that have slept among the roots crawl up the trunk to the branches. If, however, the tree has a grease band, the insects are caught on it by the mucilage.

If the tree has no band, they reach the upper parts and produce young, and these, when they reach maturity, exude from their pores silky threads that form the woolly tufts shown in the first picture.

SOME OF NATURE'S INSECT CHILDREN

1. Ringed Club Dragon-fly (*Cordulegaster annulatus*). 2. Giant Stone-fly (*Perla maxima*). 3. Red Nymph Dragon-fly (*Pyrrhosoma nymphula*). 4. Flat Book Dragon-fly (*Libellula depressa*). 5. Bronze Club Dragon-fly (*Cordulia ænea*). 6. Beautiful Maiden Dragon-fly (*Calopteryx virgo*). 7. Common May-fly (*Ephemera vulgata*). 8. Giant Dragon-fly (*Æschna grandis*). 9. Robber Dragon-fly (*Lestes sponsa*). 10. Golden Osmylus (*Osmylus chrysops*). 11. Great Green Grasshopper (*Tettigonia viridissima*). 12. Small Caddis fly (*Phryganea minor*). 13. Leathery thrips (*Phlœothrips coriacea*).

14. Migratory Locust (*Locusta migratoria*). 15. Lacewing-fly (*Chrysopa vulgaris*). 16. German Blatella (*Blatella Germanica*). 17. Two-colored Triænodes (*Triænodes bicolor*). 18. Common Earwig (*Forficula auricularia*). 19. Senile Slender-horn (*Leptocerus senilis*). 20. Great Caddis-fly (*Phryganea grandis*). 21. Gray Scaly Wing (*Pholidoptera griseoaptera*). 22. River Earwig (*Labidura riparia*). 23. Little Earwig (*Labia minor*). 24. Wood Nemobius (*Nemobius sylvestris*). 25. Sea-green Grasshopper (*Meconema thalassinum*). 26. Domestic Cockroach (*Blatta orientalis*). 27. Mole Cricket (*Gryllotalpa vulgaris*). 28. Field Cricket (*Gryllus campestris*). 29. House Cricket (*Gryllus domesticus*).

DRAGON-FLIES, BEES, ANTS AND FLIES

1. Meat-fly (*Musca lardaria*). 2. Ox-eyed Astata (*Astata boöps*). 3. Drone-fly (*Eristalis tenax*). 4. Fiery-starred Syrphus (*Syrphus Pyrastri*). 5. Cow-dung Fly (*Scatophaga scybalaria*). 6. Pale Bishop's-mitre (*Asopus luridus*). 7. Crane-fly (*Tipula longicornis*). 8. Trogos Ichneumon Fly (*Trogos atropos*). 9. Fiery Ruby-tailed Fly (*Chrysis ignita*). 10. Girdled Tenthredo (*Tenthredo zonatus*). 11. House-fly (*Musca domestica*). 12. Crœsus Saw-fly (*Crœsus septentrionalis*). 13. Solid Ichneumon Fly (*Ichneumon crassorius*). 14. Turnip Saw-fly (*Athalia spinarum*). 15. Horse-fly (*Hippobosca equina*). 16. Broad Tachina (*Tachina grossa*). 17. Field Mellinus (*Mellinus arvensis*). 18. Feathered Volucella (*Volucella plumata*). 19. Giant-tailed Wasp (*Sirex gigas*). 20. Tawny Digger (*Pompilus fuscus*). 21. Great Gadfly, or Cleg (*Tabanus bovinus*).

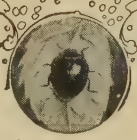
22. Sand Cercerís (*Cercerís arenaria*). 23. Norwegian Saw-fly (*Sirex juvencus*). 24. Scarlet Hopper (*Triepphora sanguinolenta*). 25. Hairy Dasypoda Bee (*Dasypoda hirtipes*). 26. Stone Bumble Bee (*Bombus lapidarius*). 27. Fly-bug (*Reduvius personatus*). 28. Orange-colored Saw-fly (*Cimbex lutea*). 29. Garden Saw-fly (*Lyda hortensis*). 30. Four-spot Crabro (*Crabro quadrimaculatus*). 31. Guest Bee (*Psithyrus vestalis*). 32. Hive Bee (*Apis mellifica*). 33. Solitary Ant (*Mutilla Europæa*). 34. German Hornet-fly (*Asilus Germanicus*). 35. Hairy-bodied Saw-fly (*Trichiosoma lucorum*). 36. Hornet (*Vespa crabro*). 37. Tree-wasp (*Vespa arborea*). 38. Wood-ant (*Formica rufa*). 39. Rose Saw-fly (*Hylotoma rosæ*). 40. Water-boatman (*Corixa Geoffroyi*). 41. Eared Hopper (*Centrotus cornutus*). 42. Scarlet Bug (*Pyrrhocoris apterus*). 43. Ichneumon Migrator (*Spilocryptus migrator*). 44. Common Wasp (*Vespa vulgaris*). 45. Rhyssa Ichneumon Fly (*Rhyssa persuasoria*). 46. Water-scorpion (*Nepa cinerea*). 47. Great Hornet-fly (*Asilus crabroniformis*).

A swarm of locusts in Algeria.

INSECT FRIENDS AND FOES

CONTINUED FROM 6630

SERIOUS thinkers have gravely asked whether the last and greatest of man's fights for the mastery of the earth is not yet to come, and whether he will win.



Colorado Beetle.

We have beaten all the great beasts of the forest, the jungle and the plain. We gain steadily against the strongholds of the venomous reptiles, even though snakes in India still destroy twenty thousand lives a year. But the insects remain unsubdued, perhaps more terrible than ever before.

They affect us in more than one way. They kill us by rapidly fatal disease; they weaken us and make us ill. They shorten our food supplies, both in our crops while they are growing and in such supplies after they are harvested and stored. They ruin our waning timber supplies. They incapacitate and kill the cattle and other animals on which we still rely for food and labor. They war against our comfort, our clothing and our homes. They are closely related to our lives and affairs in ways we little think of.

In many ways they are better fitted for existence in this world than we are. They multiply rapidly and man increases but slowly. They have great powers of concealment, and have developed a defensive armor.

All insects, however, are not the foes of man. Some of them, on the contrary, act as his friends, finding their prey in the insects that are destroying his crops or otherwise acting against his peace. Among these friendly allies the bumblebee ranks high.

New Zealand is the greatest single source of British foodstuffs, of dairy produce, of mutton and lamb, and second only to great Australia in point of wool. Think of that, and then ponder the conditions of less than a hundred years ago. The early colonists naturally wanted cattle, horses and sheep about them, but native growths furnished no suitable fodder, and without food there could be no herds, no flocks.

As they could not find ships to maintain a stream of fodder to the other side of the world, white clover was sent to New Zealand. Though it grew luxuriantly in the first year, it died down without seeding. There were no insects in the land to fertilize it, so the honeybee was sent to New Zealand in 1842. Since then the land has never lacked white clover. But white clover did not suffice; red clover was needed. That, too, was sent, but also in vain. Red clover, like white, would not set its seed in a bee-less land. Then it was that some despised

entomologist, who knew the secret of red clover and the way of a bumblee, sent a cargo of bumblebees from England to New Zealand, and from that time forth there has been no failure of clover, nor of beef and mutton, leather and wool, butter and cheese.

Wool is the Golden Fleece of Australasia, and it is founded on bee labor. The wonderful fruits of the same and other continents—the peaches, apricots, nectarines, pears and apples—are a direct gift from insects, without which these trees cannot be fertilized, cannot yield fruit.

THE BEES WHICH BROUGHT PROSPERITY TO JAPAN

Japan has fruit enough for her own population, and a growing surplus with which to swell the food supply of the outside world. She owes it to imported bees, for though Japan had bees of her own, they were less industrious than honeybees. They gathered honey sufficient for the hour and no more. They visited few blossoms; Japanese fruit trees remained largely unfertilized, and such fruits as they grew were small, poor in quality, and devoid of sweetness. The Japanese imported bees, and these marvelous little alchemists have made her a land flowing with honey and sweetness.

A honeybee desires to live beyond the morrow: it accumulates stores to outlast the winter, and so slaves throughout the summer, the very embodiment of energy, visiting not only clover but fruit trees, and giving man fruits of value and beauty which no other agency could contrive.

The subject goes very deep. We have seen that mites, living as parasites on bees, choke the breathing-tubes of the honey-makers, and are as fatal to a hive as plague is to a human community. But are all mites as pestilent as that? What of the mite which attaches itself to the house-fly? Are these as harmful to the fly as their cousins to the bee? If so, then we should encourage the fly's parasite and get rid of the fly. That is a problem the entomologist has to solve.

THE BAD DAY FOR MAMMALS WHEN THE TICKS CHANGED THEIR HABITS

We never can say without prolonged experiment whether insects which are parasites in habit may not transfer their attentions from one form of host to another. Practically all the mites and ticks, sources of immense suffering and damage to ourselves and our animals, are by nature intended to suck the juices of plants; yet they have turned to mammalian blood and become one of the chief scourges of the earth.

Science has yet to find out how natural laws work with parasites and particular species. There are, for example, two of the most dreaded creatures in the world in the cotton bollworm and the cotton boll-weevil, the insects which threaten the cotton crop of America.

A voracious feeder on the cotton plant, the bollworm is a vicious cannibal, and two of the same species seem unable to meet without trying to devour each other. Sometimes one succeeds; where the two are equally matched they usually inflict such mutual injuries that both die. Egypt has mastered a similar peril to her cotton by preserving the egret in her cotton-fields.

But worse than the work of this worm is the work of the cotton boll-weevil, of which we read on page 2784. This weevil is a horny-coated beetle, and is well protected by its resemblance to the color-scheme of its surroundings.

THE LITTLE ALLIES OF MAN IN HIS FIGHT AGAINST THE BOLL-WEEVIL

Human devices have not been able to overcome it, but men can summon aid from its natural enemies. Of these there are nearly thirty insect-forms which live as parasites on the weevil; among them four species of mites, some bugs, some beetles and ants, some flies, and, most astonishing of all, a caterpillar, all devouring either the eggs, the larvæ or the adult cotton boll-weevil.

The caterpillar, which is an enemy to the cotton boll-weevil, and therefore a friend to man, is itself a pest. American farmers call it the cotton-leaf worm. Before the weevils crossed the Rio Grande on their way from the wild cotton of Mexico about the year 1892, these caterpillars were an unredeemed pest, consuming the cotton plant as the caterpillar of white butterflies consumes cabbages. Fortunes were spent in battling with this grub before the weevil came, and then the enemy became the ally. The very damage the leaf-worm did in stripping the foliage denied the weevil and its offspring protection from the sun, so that the plant became a death-trap to the weevil.

Wonderful to relate, however, the

moth's caterpillar changed over to a partial animal diet. It turned on the buds in which the grubs of the weevils were housed, and ate buds, larvæ and all; and it has happened, therefore, that this larva, which was one of the most dreaded creatures in the cotton country, has become a sort of partner in the cotton-grower's fortune. We cannot say, however, to what extent it may become valuable in fighting the deadly pest whose annual board-bill costs about 200 million dollars, with as yet no clear signs of reduction.

A SOUTH AFRICAN SPECTACLE WHICH BRINGS BIBLE DAYS TO MIND

There are parasites in the locust world, but we do not know how to foster and strengthen the parasites against the terrible enemy of mankind. Perhaps a locust has no greater enemy than another locust, for the young locusts eat other young ones, and the adults, when food grows short, become ferocious cannibals.

Perhaps man himself may prove the great parasite here, as in so many other directions. In Australia he is coining into gold the rabbits which have taken such toll of his prosperity through the three or four generations which have passed since their introduction into that great land. There is a hint that the locust may now be used in similar fashion. By proclamation of the South African Government a July day in 1924 was observed throughout the Union as a day of prayer and humiliation, in consequence of drought and a widespread plague of locusts. The Governor, the Prime Minister and the Cabinet attended a service of supplication. It was a moving spectacle, carrying the mind in a flash back to Bible days.

THE PROFIT THAT MAY COME FROM THE PLAGUE OF OTHER DAYS

And then the other side of the medal, in absurd contrast, was this—that consignments of locusts were arriving in Holland from Johannesburg to feed cattle and poultry, and to provide oil for airplane engines. We search the seas for dolphins because in their mouths is an oil incomparable for the fine works of our best watches. We crush the locust and press out its oil because it has unique properties which enable it to retain liquid form when exposed to the intense cold of the heights to which airplanes fly.

Here is a great contrast: a present cause of woe and poverty which may in time become a rich asset; a plague from earliest times in hot lands which may add at last to the prosperity and well-being of mankind. In the event of the experiment being successful, the locust may actually become a source of profit.

Having this in mind, our sense of gratitude to the Cantharides beetles may be a little lessened, though some of the 1,500 species are notable devourers of locust eggs. Some speak of grasshoppers when they mean locusts, and so mask the fact that they have their terrible swarms of these ancient and relentless enemies of mankind.

That being so, we should be specially grateful to certain blister beetles of the Cantharides group. The mother beetle lays her eggs near the spot in which a mother locust has deposited her packet of eggs. When the young beetles hatch, it is their task to search out and find the buried treasure of locust eggs, to bore down to them, to pierce a way into the egg-pod, and there to dine and sleep, sleep and dine, until the time arrives for a new skin, and for the opening move in one of the most astonishing series of changes of form—six in all—known to science.

SIR FRANCIS DRAKE'S GOOD JOKE ABOUT THE SPANISH FLY

We call this creature the Spanish fly, and from its body the chemist derives a substance so acutely irritant that, applied to the flesh of human beings, it raises blisters. We call this a counter-irritant, and use it to relieve deep-seated congestion. It is applied to the backs of the legs of horses whose tendons have been strained by too much heavy hauling.

There can never be any difficulty in remembering the name of this little insect, for it forms the subject of a famous joke attributed, without historical foundation we fear, to Sir Francis Drake. The legend runs that when he fought and beat the Armada, and saw the broken fleet fleeing before him in terrified disorder, he sent a jubilant dispatch to Queen Elizabeth consisting of one word, "Cantharides," by which he meant, of course, *The Spanish Fly*.

We have looked at some examples of one class of insects attacking either the eggs, larvæ or adult forms of other kinds of insects, to the great advantage of man. Another instance is afforded by the Calo-

soma beetle, which waxes fat on the eggs of the gipsy-moth, a picture of which appears on page 6534.

But, leaving these aspects of enmity between different classes of insects for a moment, let us go back to the scheme of policing arranged by Nature within one family. That takes us back to the great bug family and brings us to what is popularly known as the fly-bug.

The friendly insect that destroys insect enemies in our homes

It is a true bug of extraordinary habits. Four-winged and a great flier, it enters human habitations by night when the lights are on, and makes ordinary bugs its prey, though other insects injurious to us are included in its menu. The larvæ of this creature may develop in houses, in outbuildings, or even in the bark of trees. Whatever their home, they have the extraordinary habit of concealing themselves by enveloping their forms in the fine débris amid which they move.

That insect is a fly only in name, but we may pass to flies which are a reality, and find that war is being waged on the other side of the world against flies which are attacking both the meat and the wool supply of the world.

The North has given Australia all the domestic animals she possesses. We have given her plagues among her possessions. The horrid blow-flies from the North have also made the long voyage there—some as adults in ships, some as larvæ in stores. For long these blow-flies confined their attentions to the flesh of slaughtered animals, to carrion and the rest; but then an astonishing thing happened.

The insect that costs an Australian state $5,000,000 a year

In New Zealand a parrot called the kea turned ravenous traitor and started killing the sheep in pasture and fold by tearing open their backs with its cruel beak; and the blow-flies have now turned on the Australian sheep, with results no less deadly. They settle on the wool and produce live grubs which burrow down to the flesh and devour it.

When we learn that damage amounting to five million dollars for a single Australian state, and to three times that figure for the whole continent, results in one year from the practices of these flies, we remember what old Linnæus said—that three flies will destroy a carcass as surely as a lion can devour it.

Australian sheep-farmers, whose all is in their flocks, were driven almost to despair by this new catastrophe which threatened to become chronic; but a natural ally was unexpectedly found in one of the Chalcid wasps, a native which, turning from a former diet, quite unlike, devoted itself to the consumption of blow-fly larvæ. It proves that this wasp can be artificially stimulated to enormous productivity, yet the Commonwealth Government was not satisfied with one species.

Professor Maxwell Lefroy, of the Imperial College of Science, was sent from London to Australia during the World War to do battle with insects which were destroying the grain accumulated there, but which could not be delivered owing to submarines and shortage of shipping. The Australian Government asked him for a remedy against the blow-flies which England had had the misfortune to send to the antipodes. After his return to England the professor worked industriously at the subject in his laboratory, and was able to furnish an opening list of insects fatal to blow-flies.

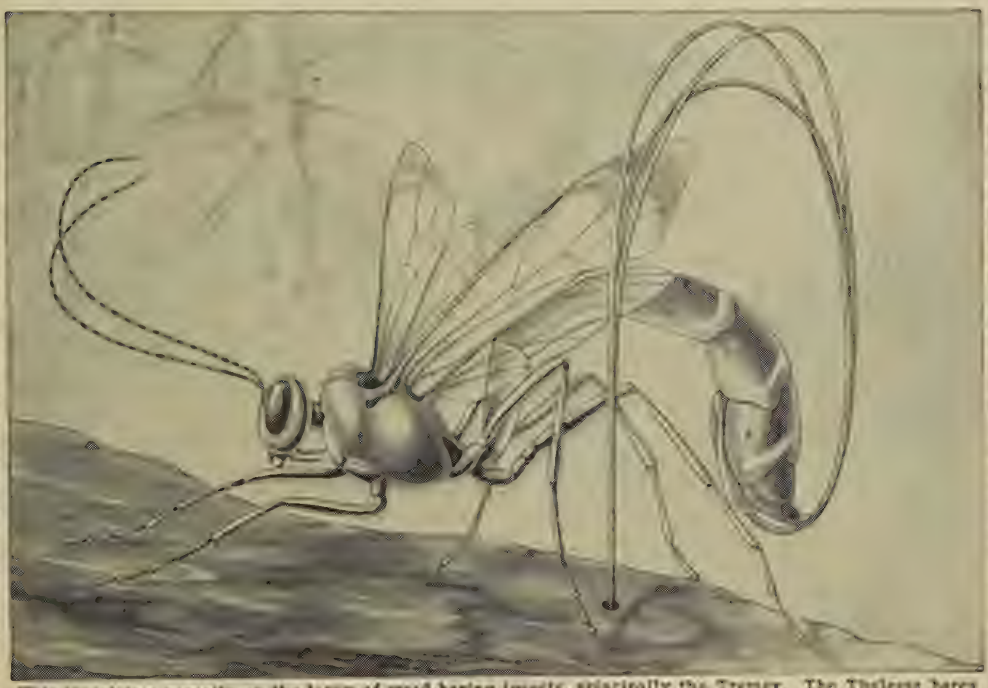
The English friends of the Australian sheep-farmers

There is what we call the *Alysia manducator*, which searches out the blow-fly larva and lays an egg in its body to hatch and devour the offending maggot. There is a powerful and audacious yellow-fly often seen about meadows, following in the footsteps of cattle, which attacks the blow-fly, seizes it at the back of the neck, and sucks its juices like a spider, but does not assail man or his animals. There is the *Hydrotœa dentipes*, whose larva lies down with the blow-fly larva and eats it, but does not attack a healthy sheep.

All these insects can be sent. They can send the eggs in cold storage; they can hatch the grubs, pack them in earth, and send them as first-class passengers in the ship's cool chambers. They can send them to Australia, to South Africa, to the Argentine, or anywhere in the world where blow-flies are attacking inoffensive sheep. It is possible to do it on mass-production lines, but it has not been done in that way. It is better to move cautiously, for we cannot always predict what course a parasite introduced into a new country may ultimately follow. New Zealand farms and fields are suffering from insect pests because dragon-flies

THE FRIENDLY ICHNEUMON FLY

One of the strangest of the ichneumon flies is the Thalessa. On the right is a male and on the left a female. Both insects are flying, and it will be noticed that the female has an enormously long ovipositor for depositing her eggs, which trails out behind her as she travels through the air.



This insect is a parasite on the larvæ of wood-boring insects, principally the Tremex. The Thalessa bores into wood and lays an egg near the place where the Tremex has already laid her egg. To see the female Thalessa laying her egg is an interesting sight to an entomologist. The Thalessa carves her ovipositor, which is divided, over her back and brings it forward to bore the hole and lay the egg.

When the Ichneumon larva hatches out it attaches itself to the Tremex larva and feeds on it.

This shows a magnified view of the Thalessa larva when ready to change into a pupa.

In the pupa the ovipositor is curled round the body ready to be unfolded when the right moment arrives.

At last the insect emerges, makes its way out of the timber, opens its wings and flies off in the way shown in the first picture, to repeat the strange life-story.

THE ENEMY OF THE APPLE TREE

The apple trees in an orchard are often found dying, with little round holes in their trunks near the base.

From the holes we might see a handsome insect about three-quarters of an inch long emerge and crawl up the trunk.

This insect is a beetle, brown with two white stripes, and is known as the apple-tree borer. The female is the larger.

The beetles emerge from late May to the middle of July, and the female, after nibbling a little pocket, lays eggs in it.

The egg is then laid in the pocket and pushed under the bark. It is oval and brown, and is covered with a gummy substance. Here the insect is flying away.

In two or three weeks the egg hatches out into a pale yellow grub, and this begins tunneling under the bark in the sapwood. The grub is here shown magnified.

The grub tunnels for a year or two, remaining dormant each winter, but working farther into the wood from March to late autumn.

It often cuts across the tree, and several grubs at work in one tree will riddle it. In the third summer the grub extends its burrow to the bark of the apple tree, packing it full of sawdust and woolly fibre.

Near the end of the tunnel a small chamber is left, both ends being plugged with sawdust, and after hibernation the grub sheds its skin and changes into a pupa, yellowish at first but growing much darker later.

In about three weeks the adult beetle emerges, to begin its work over again. This is probably the most destructive of all pests that attack the apple tree. No remedy is yet known, though scientists are at work on the problem.

THE STORY OF THE TERRIBLE HOUSE-FLY

Here is one of the worst foes of man. After sleeping through the winter the fly wakes up in spring and lays hundreds of oval white eggs in any filth lying about.

The eggs hatch out in from 8 to 24 hours. Each egg splits, and a white legless grub, tapering in shape from the small pointed head to the blunt extremity, emerges.

It grows rapidly for five days, and it twice casts off its skin and makes a new one. It remains white during its growth until the end, when it may become yellowish.

The grub now crawls to a drier place. Its body contracts and becomes cylindrical, changing to dark brown. The larval skin becomes a pupa-case and the larva a pupa. Above is the case, and below the pupa.

If the weather is warm, the fly comes out of the case on the third or fourth day, pushing off the top, and slowly coming out, with its wings loose and crumpled. It then crawls to the surface and its wings dry.

This picture shows the upper and under surfaces of the fly. In from ten to fourteen days after emerging from the pupa it is mature and able to lay eggs. It never grows after becoming a fly. This is its final form.

The fly now visits all kinds of rubbish, much of which adheres to its hairy legs. It flies into a room and crawls over the food, depositing millions of germs that cause disease. One fly may carry 7,000,000 bacteria and deposit 700,000 at every footprint.

The fly has also a nasty habit of swallowing its food over and over again, and this leaves a dirty spot on the substance where the fly was standing. Each spot contains thousands of disease bacteria. The fly causes thousands of deaths every year.

THE LIFE-STORY OF THE LADYBIRD

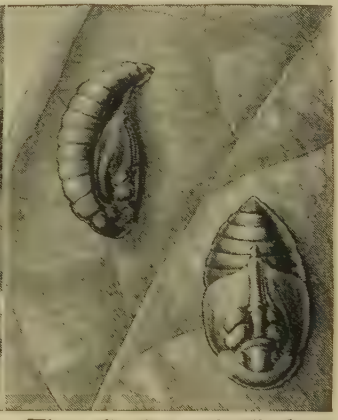
During the winter the ladybird hides away in some obscure place and sleeps through the cold weather, but in spring comes out into the open.

She visits some place where her young are likely to find food, such as a rosebush visited by plant-lice, and there lays a number of eggs.

Very soon the young hatch out into little slaty gray larvæ, looking something like miniature alligators with six legs, as shown here.

The larvæ feed voraciously on the plant-lice, devouring large numbers, so that a swarm of ladybird larvæ will clear an infested bush.

Birds would prey on the larvæ, but they scare off would-be enemies by exuding an evil-smelling fluid from their legs.



When, after two weeks, the larva is full grown it attaches itself to a leaf or twig, and becomes a shiny black-and-orange pupa.

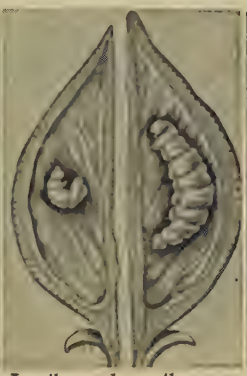
About two weeks later the perfect ladybird, which is really a beetle, with its black-spotted orange coat, emerges from the pupa and feeds on the plant-lice.

The ladybird flies from plant to plant by means of gauzy wings which, when it is resting, are kept folded away carefully under its gaudy wing-cases.

LIFE-STORY OF THE COTTON BOLL-WEEVIL

In spring a little brownish beetle appears on the cotton plants in America, having just awakened from its winter sleep, and begins to feed on the leaves of the plant. Here we see it in two positions, natural size, and greatly magnified. It is one of the worst enemies of man, and is injuring the cotton industry.

When the buds form, it bores a hole and lays an oval, pearly white egg inside, visiting several buds each day.



In three days the egg hatches out into a tiny white larva, or grub, with a brown head, and this feeds on the bud.

The grub, as it grows, changes its skin three times, and its castings form a case inside which it changes to a pupa.

Here is the pupa, and in four or five days the case splits open and the adult weevil comes out and repeats the story.

Each female lays several hundred eggs, and when the bolls, or seed-cases, containing the cotton are formed, eggs are laid in these, the larvæ feeding on the cotton and ruining the boll. In twenty weeks the offspring of a pair of weevils reaches 12,755,100.

With the first frosts of autumn many adult weevils die, but others fly off to hibernate in hedges, woods, cornstacks, farm buildings, under the grass, or in empty cotton bolls. In spring they wake up, come out, and begin again the story.

which should eat them are being devoured wholesale by trout in the rivers to which they were sent. Still there are great successes as well as partial ones, and it is to be supposed that anyone, farmer or gardener, whose crops, vegetables or flowers are afflicted by the hateful plant-lice would be grateful to any institution which would send him an additional stock of lacewing flies.

THE STRANGE HABITS OF THE LARVÆ OF THE LACEWING FLY

They lay their eggs wherever plant-lice abound, and very curious those eggs are. Each one is raised on a slender but strong stalk like rigid silk, spun from the mother fly's body. The larvæ hatch quickly in early summer, and, looking rather like the young of ladybirds, and behaving similarly in their attacks on the green enemy, feast enormously, for our good and their own.

Some of them have the extraordinary habit of slipping into the skins of plant-lice which they have sucked dry; others clothe themselves in any kind of material to which they can gain access.

The ant-lion, which, like the lacewing, is a native of America, might also be another ally, but as all is grist that comes to his mill, and he may destroy our friends with our foes, we must not wholly rely on him for steady service. Still, he appeals to our sense of the marvelous.

HOW THE ANT-LION LIES IN WAIT IN ITS LITTLE PIT OF DEATH

In the perfect condition it is hard to tell the ant-lion from a lesser dragon-fly, but in the larval condition he is like an ant, with jaws like a giant's. But it is not there that the wonder resides; it is in his habits. He makes his home in a dry position in fine sand, and in this he excavates a pit. He begins by excavating a circle out of which he casts the sand by means of his powerful head. That done, he makes a second and a third circle, one within the other, so that by the time the last is finished he has one continuous pitfall, two or three inches deep, spread before the feet of unwary crawling insects. Then he lies in wait, his body hidden in the sand at the bottom of the pit, only his jaws sticking out. Along comes an ant or other insect. Inquisitive, perhaps incautious, it peers over the edge of the pit, and slips. The light sand is dislodged by its feet, and down sand and insect go together.

It may seek to escape, but there is no escape from the dungeon of this little Giant Grim. The moment the sand begins to topple, the ant-lion jerks up more. Some observers hold that the insect deliberately throws the sand at its victim in order to unbalance and confuse it in its struggle to return up the slippery slope. We do not know. Be it accident or design, the ant-lion does bombard his victim, does bring him down, and does fix his terrible jaws in him. The grip must be the counterpart in the insect world of the grip of an alligator's jaws on a man whom it holds down till he is dead in the water. Indeed, it is more than that, for, once the ant-lion's jaws make their snap and close, they never relax for a moment till the victim is drained dry.

THE PERIL THAT THREATENED THE ORCHARDS OF CALIFORNIA

On the whole, perhaps we may give the ant-lion credit for helping us, and so add him to our list of friendly insects. Our catalogue would be enormous if we were to enumerate all the Ichneumon flies which are parasitic on other insects; but we have dealt with those on page 6232. They are of unquestionable aid to man. We have touched elsewhere on the Chalcid wasps, which are dealt with on page 2162, where the insect which fertilizes the Smyrna fig is called a little wasp.

One of the greatest romances of our friendly insects remains to be told. America has obtained the bulk of its fruit stocks from the Old World, in exchange for the rubber, potato, corn, tobacco and quinine which she had in readiness for the human family when Columbus discovered her. Some years ago California's stock of orange trees was recruited by supplies obtained from Australia.

It happened that scale, the outward and visible evidence of the presence of a deadly parasite, appeared on the trees, and spread from the oranges to the lemons and to other fruit. It marched across the land, as plagues do march, with terrifying rapidity, and for a time it appeared as if the orchards of California were doomed.

Once more the farmers, seeing their crops vanishing down the throats of insects, turned to the scientists, who found that, though the scale was in Australia, too, it was there kept down without diffi-

culty simply because ladybirds dined, day in and day out, on the scale-producing insects.

THE LADYBIRDS THAT SAVED THE ORANGE GROVES FROM DESTRUCTION

After many attempts a cargo of ladybirds was brought from Australia to America, and the welcome immigrants were given their liberty on the orange trees of a scale-infested orchard. The new-comers settled down to a meal of scale insects. They flourished and multiplied, and were housed and preserved during the winter as carefully as gold, so that they could be distributed about the state where disease demanded their presence.

From that time forth the collection and conserving of ladybirds has been a great business in California. Each winter men are sent out to places where ladybirds are known to have harbored and fed in the summer, and where they hibernate in masses together.

Experts go to the snowdrifts in ladybird country, dig down into the snow, and find great balls of life gathered about a nucleus of pine-needles and what not. They collect countless masses of ladybirds in these winter hunts, store them in boxes, take them in cold storage to headquarters, and keep them at a temperature below freezing-point for the rest of the winter. When spring and warmth come back to the land, and plagues of scale or plant-lice are reported, an army of ladybirds is packed into crates and sent to the endangered area.

THE LADYBIRD AS A WORKING ALLY OF THE BEE

So the ladybirds wake up thousands of miles from the place where they went to sleep; thus these little creatures have taken service, against their will and knowledge, with man. They have come to possess an importance ranking them as worthy allies of the bee, the silk-moth and the lac insects. Ours will be a cleaner and greener land when we have the good sense and initiative to send ladybird armies on all of our gardens and cornfields.

We have paid tribute to the bee as a sovereign helper of man. Let us be as mindful of the immense debt we owe to the silk-moth, whose full story we tell you in the article on Silk, on page 5307. We cannot hope to estimate the money value of the bee to the world, but we do know that the price of the silk produced each year by the silkworm was about $300,000,000 before the World War.

Some other insect friends not named here may occur to readers, who will recall with gratitude the work of some of the water-haunting creatures which have been mentioned on page 6066. But think what our ponds, pools and ditches would become but for the appetite and ardor of our water boatman, with the extraordinary hind legs he uses as oars, looking as he rests motionless like sculls.

He is a snapper-up of minute forms of life, and where the numbers of his own kind become excessive he turns on them as well. The agile pond-skaters, to which the surface of the water is as sure footing as land is to us, and other little people of still depths are constantly at work, for their own benefit chiefly, yet for ours as well.

THE GOOD WORK DONE BY THE TIRELESS SCAVENGERS OF OUR STREAMS

But for them our pools would become intolerably overcrowded with life, and fluid tombs of innumerable corpses. They do for the dead what the sexton-beetles do with creatures on land who have died; they do with the living what the friendly carnivorous beetles do with shore forms of enemies of our crops.

Even the larval forms of mosquitoes are harmless, indeed beneficial, when in water, devouring substances which would cause corruption. Their mischief brews when they put on wings, and either distil a poison to inflame our blood or become the carriers of microbes fatal alike to human and animal life.

Not all mosquitoes, as we have already seen, are transmitters of disease, and even where one species is guilty it is only the female which sucks blood. These disease-transmitting mosquitoes have influenced the course of history. Mosquito-borne diseases are now believed to have led to the downfall of Greece by the killing of adults and infants, and so undermining the constitution of the people that the one-time masters of the world, enervated and reduced in numbers, fell a prey to other nations.

VAST REGIONS OF THE EARTH WHERE THE INSECTS HOLD MAN AT BAY

We are familiar with the thought that mosquitoes, transmitting malaria, yellow fever and other maladies, held men at bay when they sought in vain to build a

canal across the narrowest part of the American continent to link the Atlantic with the Pacific. But mosquitoes and the tsetse fly did more than that. For several centuries they defied the efforts of the white races to possess and open up Africa. If we could master the tsetse fly and the Anopheles and Stegomyia mosquitoes, there is not a place in the tropics into which we might not venture, not a place in which we might not trade, work and live in safety. These insects are the actual demons of the wilds and of countries fringing the wilds, still guarding them more effectually than the dragons of fairy tales which protected treasures. The demons which fill a thousand legends of old-time travel were but the heated fancy of men who had seen their comrades die mysteriously from causes which our own generation has learned to trace to insects.

Civilization does not always decrease insect foes. On the contrary, we increase the number of our enemies when we develop their native food into something better in quality and quantity. Look at the pests of our farms and gardens—commonplace things like the carrot-fly, the celery-fly, the onion-fly, onion maggot, apple maggot, the cabbage butterflies and moth, the pea-moth, the clothes-moth, the gipsy-moth, the enemies of currants, or the cotton foes again.

Every crop they infest traces back to wild plants. There is practically nothing we grow for human use and consumption which is as Nature gave it to us. Think of the original wild cabbage, still to be found in England; of the fruits we have evolved from a few poor wild species; of the wheats we have created from the original natural strain.

We have improved on the originals and multiplied their numbers a million fold. Now, the parasites have increased with the increase of their foodstuff, bettered for them, as for us, by the fostering hand of man. They have turned from the wild species to the cultivated, and prosperity has made them so numerous that they threaten to overwhelm the cultivators who so unwillingly benefit them.

Insect species may possibly grow fewer, though the theory is that they increase; undoubtedly they grow in number of individuals, their tide rising with the tide of vegetation which human genius and industry place at their disposal.

Cotton bollworms and boll-weevils were never a plague until cotton was intensively cultivated in America and Egypt. The gipsy-moth was never a plague anywhere till it was accidentally introduced into America from eggs blown out of a scientist's window in Boston and allowed to develop unobserved for some years at large. Since then it has done more damage in America than perhaps all other moths put together.

How the Germans Stamped Out the Colorado Beetle

The Colorado beetle was an inoffensive browser on wild growths in the West, but changed its diet to potatoes, and in the course of a generation marched across the entire continent from west to east destroying potato crops entirely where its ravages were unchecked.

No other enemy to human food has ever created such a panic as this little monster. Practically every European nation has passed laws forbidding its introduction into the Old World. Nevertheless, in spite of all precautions, some years ago the beetle mysteriously appeared in Germany's potato-fields, far from the sea.

The beetle had been breeding quietly there and was in great numbers when identified. Terror seized the district. Under official orders the affected crops were plowed up, the fields were drenched with gasoline and set on fire, and the pest was stamped out.

If we could pursue heroic measures such as those in all neighborhoods where men abide among insect enemies, we could stamp out such frightful scourges as elephantiasis, pellagra, plague, yellow fever, malaria, beriberi, relapsing fever, scarlet fever, sleeping-sickness, and could banish practically all the epidemic diseases afflicting our horses, cattle, sheep, pigs and poultry.

The Value of Cleanliness in the Fight Against Disease

If cleanliness were observed in all our homes, and fleas, bugs and lice were destroyed, as they might easily be, we should conquer the deadly diseases of which these loathsome insects are the carriers. Politeness forbids the mention of their names in decent society, yet the louse alone, in addition to carrying typhus, caused the Allies the loss of a million men during the World War on the western front alone by compelling

their withdrawal from the lines as victims of trench fever.

The scourge continued unchecked for four years; then in six months a committee of experts traced the evil to its source. Before our human foes could be defeated it was necessary to fight the louse, which was undermining the strength of the armies. But these abominable vermin are tolerated in the slums of every civilized land.

Fleas, ticks, mites and the tribes to which the more loathsome human parasites belong are among the chief foes of mortal life, at home, in the tropics, in every land which has warmth enough to hatch the eggs of these little horrors.

War against the insect has become a world-wide movement. In the United States and Canada scientific investigations are receiving large government support. Every state and every province has its corps of workers. The Federal and Dominion governments employ a force of trained men, and equip and support field laboratories scattered over the country at especially advantageous centres for special investigations.

While investigating we are also making national war, chiefly a chemical one, by spraying our crops with chemical compounds and fumigating our citrus orchards and mills and warehouses with other chemical compounds. So far we have only a few simple and effective insecticides. We use arsenates, lime and sulphur sprays and fluorids, and from plants the poison of hellebore and larkspur, pyrethrum and nicotine.

Borrowing lessons from the World War, flame-throwers operated against swarms of locusts in southern France, some of the war-gases have been used experimentally against insects, and airplanes have been used against the boll-weevil on the Rio Grande, in the locating of beetle-damaged timber in the forests of the Northwest, and even in the insecticidal dusting of tree growth in Ohio.

Then, as we have already said, it being fortunately true that some insects live at the expense of others which are enemies of man and destroy them in vast numbers, the scientists in their war have imported from one country into another the natural enemies of an injurious species which has itself been accidentally introduced. Experts tell us that the annual loss to agriculture in the United States caused by foreign insect and plant diseases runs well over two billion dollars, and this leaves out the native pests.

An Ant-lion in its winged stage.

An Ant-lion.

The Tsetse Fly.

A Locust.

Chalcid Wasps.

A Locust depositing its eggs.

In 1916 a nursery in New Jersey imported some irises from Japan, and the Japanese beetle (*Popillia japonica*) came along too. Though a very good-looking insect, with its head, thorax and legs a brilliant bronze-green, it is a very deadly pest because it spreads so quickly, feeds upon so many different kinds of plants, and has such a weakening effect upon the plants attacked. In four years' time, in spite of precautions, over 50,000 acres have become infested, not only in New Jersey, but in the neighboring states of Pennsylvania and Delaware also.

The eggs of the beetle are laid in August and September, and two weeks later the young larvæ are hatched. They are voracious eaters of the roots of any kind of plants. When cold weather arrives the larvæ burrow deeper into the soil for the winter. In the spring, half-grown, they return to activity and feed on roots close to the surface. In June full-grown beetles emerge, and for six or seven weeks are very active, especially on hot days, flying from place to place and constantly feeding. During this time the female is busy laying eggs. Toward the end of September all the beetles disappear, and it is supposed that all the adults perish, each summer witnessing a new generation.

Control measures which have been used against the terrible pest (which completely skeletonizes the plant it attacks) include the destruction of all non-economic plants within a half-mile band, the clearing of roadsides and headlands within the area, strict quarantine on all produce shipped out, and the destruction of the adult beetles by poisoning the soil with sodium cyanide. But two important discoveries remain to be made before the scourge is checked: an effective poison or a deadly parasite that will prey upon it and keep down its numbers. It is toward these remedies that scientists are now working.

Some other costly foreign pests

One of the first foreign pests in America arrived during the Revolutionary War with the Hessian troops, who brought a fly along in their wheat straw. To hold this tiny so-called Hessian fly in check costs the government each year as much as the whole Revolutionary War. It has also spread into Canada and causes much damage.

The Oriental fruit-worm arrived in a strange manner. The mikado of Japan courteously presented Mrs. Taft with one of the beautiful Japanese flowering cherry trees, and, "stowing away" in it, came the worm which has become a pest very difficult to control in areas where peaches, plums and cherries grow. The brown-tail moth came in with imported roses, from Holland or France perhaps, and the gipsy-moth in a shipment of blue spruce. We have spoken of the San José scale that attacks the citrus trees. The chestnut blight has already destroyed half of the stand of American chestnuts, and it is estimated that by 1940 a chestnut tree will be a curiosity east of the Mississippi. The pink bollworm was introduced from Mexico in 1916. Ten years earlier it was known only in Egypt.

The European corn-borer is a bad pest and very seriously threatened the corn crop of the United States when it first appeared, and has crossed into Ontario. In the corn-growing countries of Europe, like Hungary and Russia, it has been recognized as a serious evil. In America it was first discovered in 1917, and is supposed to have been brought in with raw hemp from the Continent for use in cordage factories along the Mystic River near Boston. To-day it infests a big area. In the plant affected it tunnels all the parts and almost totally destroys the stalks and ears.

The pessimist's dream that will not come true

The insect problem is the greatest problem we have ever faced. Physically, we shall obtain our millennium if we master the insect; otherwise man may be destined to experience a fate foreshadowed in this gloomy dream of a modern writer:

> When the moon shall have faded from the sky and the sun shall shine at noonday a dull cherry-red; and the seas shall be frozen over, and the ice-cap shall have crept downward to the Equator from either Pole, and no keel shall cut the water, nor wheels turn in mills; when all cities shall long have been dead and crumbled into dust, and all life shall be on the very last verge of extinction on this globe; then, on a bit of lichen, growing on the bald rocks beside the eternal snows of Panama, shall be seated a tiny insect, preening its antennæ in the glow of the worn-out sun, representing the sole survival of animal life on the earth—a melancholy bug.

THE NEXT STORY OF ANIMAL LIFE IS ON PAGE 6883.

THE PEOPLES OF THE DESERT

THE WILD, FREE RACES OF THE EARTH AT HOME

CONTINUED FROM 6678

A BURNING expanse of red, gray, brown or white sand, thinly dotted with oases of wells and grass, and diversified with stony and rocky tracts—that is the scene which springs up in imagination at the very mention of deserts. The mind at once flies to Arabia, the typical land of wilderness desolation, or to the vast African Sahara, for these two marvelous regions have always been, above all others, representative of the desert.

But the world's great deserts are vaster and more varied than most of us realize. There are many great uninhabited wastes in the world, caused chiefly by the lack of rain. On page 2421 you can find out how deserts are formed, and in that chapter there are also pictures of some of the principal ones.

The most extensive of all the Asiatic wildernesses is the Mongolian Desert of Gobi. Arizona, one of the largest states of the United States, contains one of the biggest deserts of the New World. Other regions are arid and barren, bearing nothing but sagebrush and cactus. One of the most dreaded of the deserts is that in the interior of Australia.

The Arabian and African wilderness regions must ever exercise the most fascinating influence on the minds of civilized peoples. Consider the ways, for example, of the various tribes of the Arab race. The Arabs are divided mainly into two sections—those who inhabit towns, some on the borders of the desert, others within the wastes; and those who restlessly wander here and there. Now, the wandering, or nomad, Bedouin is very interesting. He has a hard life, but it is a very healthful one, and in some respects it is a happy existence, with its absolute freedom from town restraints and its enjoyment of the pure sweet desert air.

Two of the largest and wealthiest of the Arab tribes are the famous Anaeze and the Shommar. Both are dreaded by travelers, and among them are many persistent robbers. These tribes, and several others, are constantly warring one against the other, and the settled existence to which we are accustomed in civilized countries is unknown to them. All except one particular tribe possess

splendid horses. Carrying very long spears, often measuring twelve feet, pointed with steel lances, the Bedouin horsemen riding on these lovely steeds present a fine spectacle, especially when they indulge in the picturesque games in which they delight. They are fond of galloping and racing, and they like also the exercises in which they play at war.

Arab steeds are so well trained as rarely to need an iron bit. The ordinary Arab bridle is almost the same as our halter-strap. The desert horse seems to understand its master, and almost to interpret his will by a movement or touch. Most of the horses belong to the sheiks, or head men of the tribes, and, except when they are needed, are kept at some distance from the camp.

THE WEALTH OF THE WANDERING ARABS

The Arab term Bedouin means "desert-dweller," and the traveler must wonder how these Bedouin tribes can exist at all in a vast sandy or rocky waste. Of course there are great sandy areas, but a large part of the Arabian wilderness is a desert simply in the sense that it has no settled population.

If all were absolutely barren, these nomad Arabs could not live and prosper, and grow wealthy as some of the sheiks do. The fact is that very large tracts of the soil are excellent. In springtime, after a heavy rainfall, northern Arabia becomes like our prairies over large areas. Lovely wild flowers spring up that would delight the heart of a botanist. This explains why the wandering Bedouins are rich in the possession of thousands of cattle, camels, horses, sheep and goats.

Dr. Zwemer, who lived at Bahrein, in the Pearl Islands, and who has traveled much as a devoted missionary among the desert tribes, says: "I am sure you can still find some of these Bedouin chiefs who, like Job, have seven thousand sheep, and three thousand camels, and a great household."

Just as in the time of Job, thousands of years ago, so do these children of the desert to-day dwell in black tents made of goat's hair, which forms a perfect waterproof covering. These tents are square or oblong in shape.

THE STRANGE SPECTACLE OF A DESERT CAMP

An Arab desert camp is a singular spectacle, but it is well worth visiting. For the journey into the desert from some outlying spot, presents and a guide should be taken. The guide walks barefooted, for he prefers to carry his sandals tucked in his girdle.

Presently we come to flocks of sheep with their shepherds, who direct the guide to the camp. This never remains more than a month in one spot. It is sure to be pitched in some hollow, the deepest that can be found, for two reasons—the necessity of concealment from hostile bands of fellow Arabs, and the advantage of shelter from the hot winds.

THE DELIGHTFUL COURTESY OF THE ARAB TRIBES

The great encampment is carefully arranged. Some tribes spread their tents in a great square in rows; others prefer a picturesque oval. One feature never is lacking—the symbol of the authority of the sheik. This little king always plants his spear in front of his tent. Just behind it is the section curtained off for the reception of guests. And how effusive is the hospitality of these Arabs, robbers and assassins though some of them are! Their kind courtesy to visitors never fails, even though in the desert they would rob the very same folks without the slightest compunction, and perhaps slay them if resistance were offered. But never is a Bedouin of the wilderness known to violate the beautiful law of hospitality. Out of the burning sunshine the weary traveler is welcomed. The women hasten to bring him water to cool his head. A great bowl of camel's milk is offered before any questions are asked. At night a fat kid or lamb will be killed, and a feast provided.

THE MAGIC UNGLAZED JUGS WHICH ARE POROUS

There are real luxuries in the Arab tents. The tents are spacious, for they will accommodate considerable quantities of several sorts of grain, chaff, fruits, dried fish and wood. There is also ample room for refuge for fowls, goats, some cows and a horse or two. The great main room has in the centre a large hollow which serves as the fireplace. The smoke must find its way out as best it can, so in time the tent becomes blacker and blacker; indeed, the old Bible phrase which speaks of the "black tents of Kedar" is as applicable now as then.

THE HOMES OF THE PEOPLE OF THE DESERT

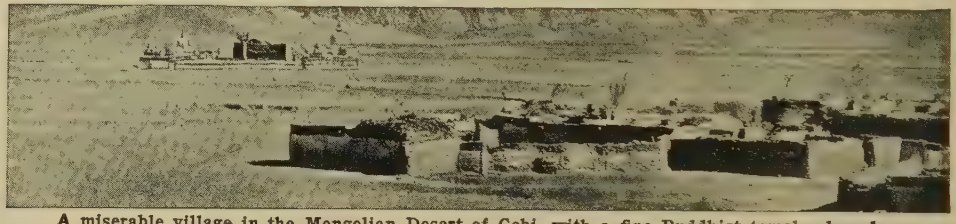
A Bisharin tent in the Sahara Desert.

An Indian hut in the Arizona Desert.

© Underwood & Underwood.

A group of Bisharin tribesmen in the great Sahara Desert.

The city of Tunis, with its flat roofs which largely take the place of gardens.



A miserable village in the Mongolian Desert of Gobi, with a fine Buddhist temple close by.

The picturesque market place at Assiout, on the Nile, with the mosque in the centre.

SCENES AND PERILS OF THE DESERT TRAVELER

The mirage—sometimes an imaginary oasis appears to a caravan of travelers.

A caravan crossing the Sahara, with "tents" on the camels for the women travelers.

A sandstorm in the great Australian desert. Camels were introduced into Australia for use in the desert.

One great blessing is the famous porous jug. The Arabs who live and work in towns make unglazed water-jugs and jars. These are an unspeakable boon for the people, for they have no ice. The wells are never very deep, and the water comes from a long distance. Thus, if it were not for water-jugs of this kind, cold water would be unknown. How, then, is it cooled? Very simply. If poured into one of these porous earthen pots and hung for a few minutes in the wind, the effect is astonishing, for the beverage becomes deliciously cold and refreshing.

WHAT THE PEOPLE OF THE DESERT EAT AND DRINK

Palatable and wholesome is the desert fare. There are luxuries also in the food, though we should hardly relish the favorite dishes of the tribes, such as *leben,* the peculiar sour milk of mares and camels, which in Turkey is called *yoghurt; pilaf,* which is rice beautifully cooked and containing little shreds of lamb or kid or chicken. But when the Arabs make a great feast in the desert, they roast a sheep or goat whole on red-hot stones. Hard biscuits in the shape of rings, called *kak,* are much relished, and so is the peculiar butter called *ghee.* When the Arabs have to carry water about, they do so in great leathern bottles made of the whole skins of sheep and goats.

One beverage that is enjoyed in the desert cannot be excelled anywhere in the world. Coffee was first brought to Arabia from Abyssinia about the year 1400 by a pilgrim, whose tomb in Yemen is an object of veneration; and the seeds planted in Yemen produce the Mocha coffee which is so famous.

DATES AND SUGAR-CANE FORM GREAT STAPLES OF DIET

The chief of all foods among the desert peoples is the date, and the most precious thing that grows in the countries inhabited by these tribes is the date-palm, one of the noblest and most graceful of all trees. The Arabs of the desert eat much wild honey, and will feed abundantly on locusts when they can; they also feast eagerly on the big lizards that dart among stony places, and do not disdain even the jerboa. But the great article of diet is the date, without which the Arab of the wilds could hardly subsist. A joyous time is the festival known in the springtime as the Marriage of the Date-palms, when the soft spring breezes waft the pollen from the male to the female blossoms.

Arab children are never happier than when they are sucking sugar-cane, which is cut into pieces and sold by the knot—that is to say, by the length of the stick from one knot to the next. But nothing is so abundant as dates. Sometimes for many weeks nothing else will be eaten in an Arab tent, and even the donkeys and camels are fed on this fruit. Outside many a tent at this moment will be Arab boys and girls playing games with date-stones on the smooth sands. None of the date-stones are thrown away, for they are ground up into a coarse kind of meal for cattle food. Indeed, nothing is wasted that belongs to the date-palm. The fragrant blossoms make a favorite beverage, and if the fruit that has not been consumed turns stale and somewhat musty, it is converted into vinegar. The leaves are woven into strings, fans, mats and baskets, and the long, thin, strong branches are made up by the carpenters in the towns into chairs, cradles, cages, beds, boats and countless other things.

THE BREAKING-UP OF A CAMP, AND DEPARTURE FOR A NEW SITE

One event in the desert is always exciting. This is the breaking-up of a camp for a migration. When a tribe shifts its quarters, all possible preparations are made on the previous day, and early in the morning everything is in motion for the great departure.

Tents are taken down and packed, and soon the country is full of camels and flocks and herds and Arabs. Sometimes ten or a dozen camels will be arranged in procession at considerable intervals from each other. To the back of each camel are fastened four upright poles, which support a canopy called a *merkab.* On this erection rides an Arab girl, prostrate on her breast. These girls are always the sisters of heroes—men who have won fame in battle.

THE SOLEMN MAJESTY OF A SEA OF SAND

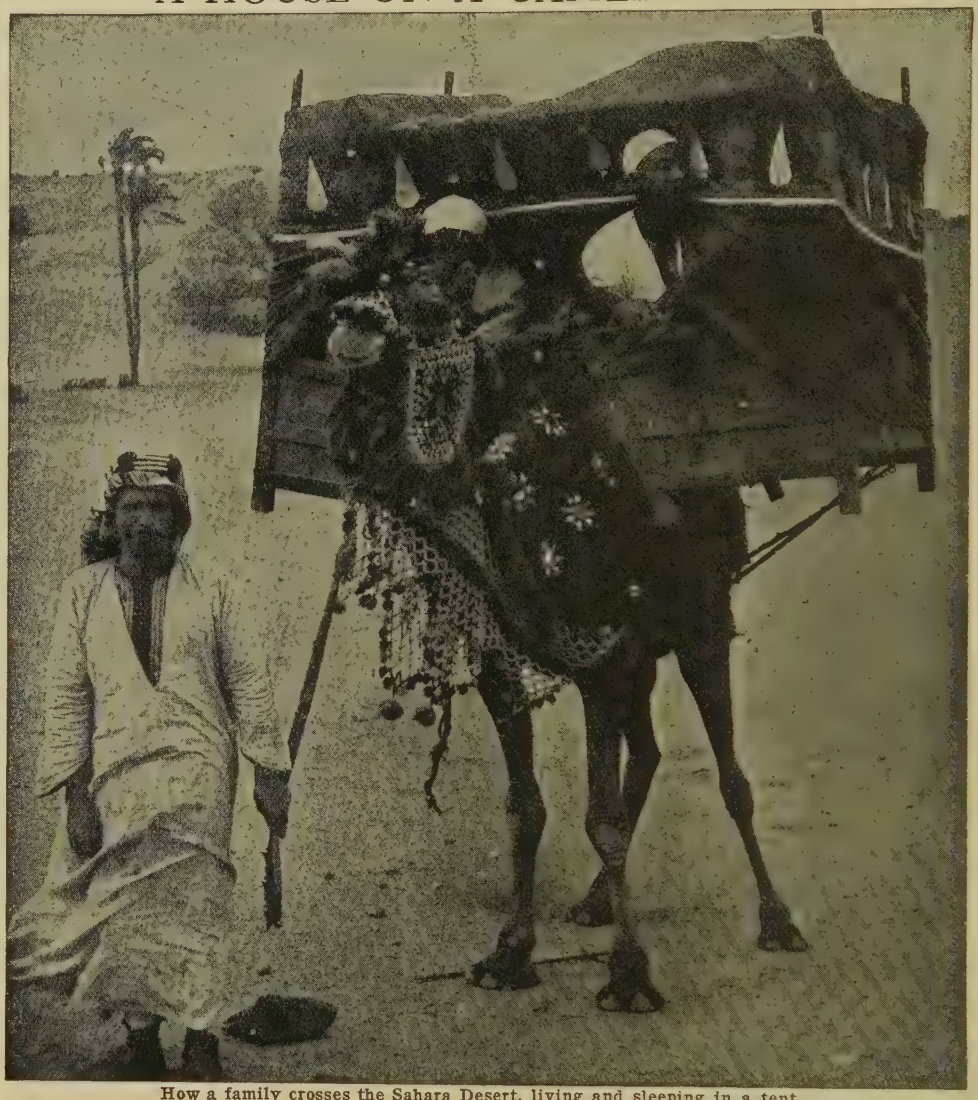
The Bedouin Arabs are ignorant in one sense, for they have no schools and few can read and write. They are temperate, for as Moslems they should not taste intoxicants. There are no mosques in the deserts, of course, but these chil-

AN ARAB SCHOOL AND AN ARAB WORKSHOP

A Mohammedan school in Egypt, where the boys wear their hats and take off their shoes.

This is a photograph of some Arabs at work. Using their fingers and their toes, they carve wood with amazing rapidity into beautiful shapes, making screens, boxes and cabinets, which go all over the world.

A HOUSE ON A CAMEL'S BACK



How a family crosses the Sahara Desert, living and sleeping in a tent.
© Underwood & Underwood.

A pathetic scene in the desert: a camel sinking in the sand of the terrible Desert of Gobi.

dren of the wilderness are much given to prayer. The first chapter of the Koran is recited in every tent five times a day, while the worshipers prostrate themselves toward Mecca.

THE VISION OF THE DESERT SKY, THE DESERT MIRAGE

Caravans—what scenes this word conjures up! The longest and most perilous caravan expeditions are those which cross the great Sahara, and this vast African desert has its charms, its unspeakable fascinations, its indescribable phenomena. One of these is the mirage, the reflection in the sky which has puzzled so many travelers in ages past.

A traveler riding in the Syrian desert from Bagdad to Babylon was perplexed by seeing what looked like the great ruin Akarkuf, though he knew that it was more than thirty miles distant across the desert. Really what he saw was an old well only a few hundred yards from where he stood wondering. Distressing have been the experiences of the members of great camel caravans crossing the Sahara, parched with thirst, under burning skies, suddenly plunged into ecstasy by the full view of palm trees forming an oasis at a little distance—for palm trees always mean a well close by. In some sad instances the travelers have rushed on to find that they had been mocked by a mirage, and men and beasts have perished for lack of water.

The towns that border the deserts often lie in the centre of surrounding barren solitudes, as does Damascus, the oldest city on earth, where are lovely gardens watered by fountains from Abana and Pharpar, the twin rivers that rush down from the snows of Lebanon.

Spots of enchantment in the Libyan Desert of Africa are the oases, great patches of vegetation caused by the presence of water-springs. Four very large and beautiful oases are inhabited by the great and famous tribe of Mugrebi Arabs, who love their gardens and villages embowered in date-palm groves, with sparkling streams ever refreshing them.

One of the most dreaded perils of the desert is the hot wind called by the Arabs the simoon. When this fierce and burning blast sweeps across the vast wastes it is deadly in its effect. Everyone in a caravan must, in order to escape alive, kneel in the sand with the mouth close to the ground, and, if possible, in the shelter of a camel, a roll of bedding or even a saddle.

The town-dwellers are gifted and clever. They excel in some crafts, especially in various sorts of woodwork. That delicate and ornate latticework which is seen in windows, doors, boxes and cabinets is highly prized. Glass for windows is rarely used in Arabia except by Europeans or by a few Arab families who have learned some of the Western ways. But in Arab houses are to be seen some of the loveliest windows that can be imagined.

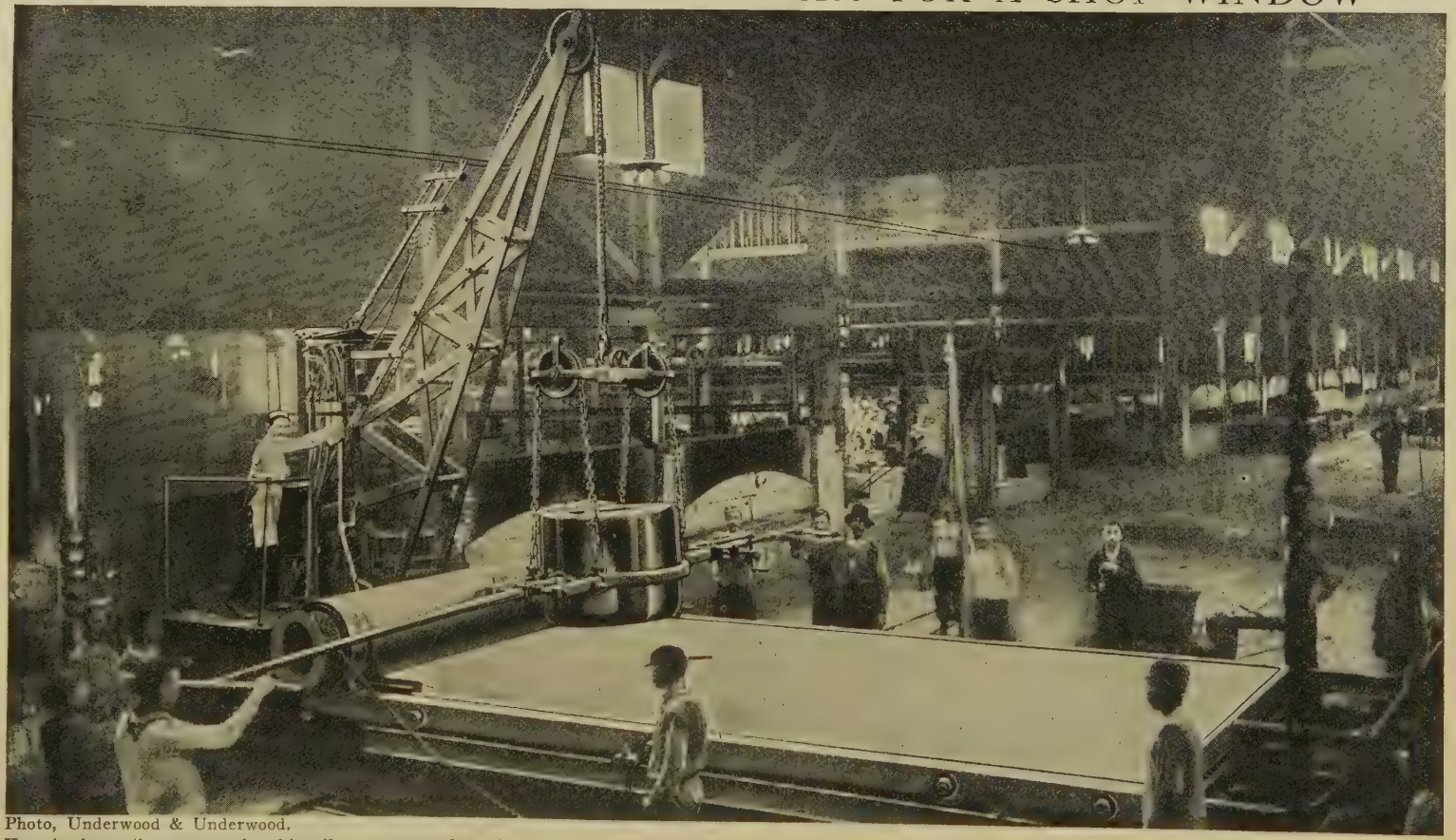
An Arab court of justice in the desert.

The Arabs call a window *shibaak*, which means "network." The joiner fashions a most delicate fabric out of date-palm wood or bamboo, making little round bars, and fitting these to each other in a great variety of decorative designs. Through this fine lattice-work light and air come into the room, but none can look through upon the inmates from the outside world.

From behind such windows the Arab women look out upon what goes on in the courtyard of the dwelling. In Arab homes special quarters are reserved for women. Into these strangers are not admitted except on rare occasions.

THE NEXT STORY OF ALL COUNTRIES IS ON PAGE 6803.

MAKING A SHEET OF PLATE GLASS FOR A SHOP WINDOW



Photo, Underwood & Underwood.

Here is shown the process of making the enormous plate-glass shop windows such as we see in the cities. The swinging crane brings the pot of molten glass above the heavy iron table. The glass is poured upon the table, and the roller you see at the end is run back and forth until the table is covered and the sheet of glass is smooth. Afterward the glass is polished and trimmed. This sheet is 12½ feet wide and 21 feet long. Perhaps some of you have looked through this very sheet.

WHAT THIS STORY TELLS US

THE sand in which you play on the seashore and the tumbler from which you drink when thirsty seem very much unlike; and yet the tumbler was made from sand. The same is true of the beautiful colored beads you wear, of the bulbs in the electric lamp, and of hundreds of other things. Below you are told something about the history of glass, and you will find that glass has been known for thousands of years. How glass is made is described, and some of the methods of making it are also shown. Glass is so common that we do not stop to think about it at all. Like so many other things which we see every day, we take it as a matter of course, and do not realize how marvelous some of the commonest things really are. This story will help to show you.

HOW GLASS IS MADE

CONTINUED FROM 6606

HAVE you ever thought of a world without glass? Glass is so common, and much of it is so cheap, that we seldom stop to think how we depend upon it. We can hardly think of a house without windows, or without dozens of glass things in daily use. We could perhaps get along without glassware on our tables, but for many uses there is no substitute. Electric lighting depends upon the glass bulbs, and a kerosene lamp will not give much light without a chimney. The ancients used polished sheets of metal for mirrors, but they were both expensive and heavy, and did not serve the purpose so well as the glass we now use.

Think also of the way in which our modern science depends upon glass. Without it there would be no science of astronomy or chemistry; medicine and the other sciences of living things would be much hindered. Without the telescope we could know little of the universe. Without the microscope we should be ignorant of many facts upon which both our knowledge and our well-being depend. Without the camera we could not take pictures—and just think of a world without photographs!

Many of these uses of glass are new, but the world has known of glass for many thousands of years. It is generally believed that the Egyptians were the first to make the substance, but some believe that it was first used in Syria. Glass vessels many thousands of years old have been discovered in both countries. Beautiful bowls were made in Phœnicia, Persia, China and India before they were known to Western Europe. The Greeks were not great glassmakers, but there is much wonderful Roman glass. In Rome it was even used for windows in a few houses, and Italy has been famous for its wonderful objects of glass from very early times. Venetian glass is known everywhere. Constantinople is another city famous for its skillful workers in ornamental glass. It is believed that some of the ancients knew how to make malleable glass, that is, glass which would bend like metal when dropped, rather than shatter into bits.

From the East glassmakers introduced their art into Western Europe, and it soon became widespread. Kings gave special privileges to the glassworkers, who were very proud, and the wealthy valued some of the things they made more highly than gold or silver. Some of the colored glass made for the windows of the great churches and cathedrals is finer than that made today. But in the Middle Ages glass was so expensive that the common people could not have vessels of glass, and never even thought of having glass

windows. Glass has become cheap enough for common use only within the last hundred years or so. Light was formerly admitted into houses through holes in the walls or in the roof. In stormy weather these openings were often closed by heavy shutters and the house was dark. Sometimes oiled paper or thin cloth was stretched over the openings. These let some light in, but one could not see through them. Not very long ago the fact that a man had glass windows in his house was supposed to show him to be a man of wealth, and he was taxed accordingly on the number of these windows. As a result many houses were dark.

Among the earliest settlers of Jamestown, Virginia, were some glassworkers, and in 1639 glass was made in Massachusetts. Before the Revolution several other factories were set up in different colonies, and now there are several hundred in different parts of the country. Though there are so many, much glass is still imported from Europe. Canada has several glass factories, but they cannot supply all that is needed.

WHAT IS GLASS AND HOW IS IT MADE?

Glass is a compound of several substances, but the chief is silica. Now, silica is the largest and most important part of quartz, and therefore of sand. So we see that the principal source from which glass comes is sand. Some of this sand is gotten by crushing quartz or sandstone; some is obtained from the seashore, from the beds of streams; and sometimes it is taken from the land. Nearly all of it has some impurities, and some sand cannot be used at all because of the presence of large quantities of iron or other minerals which would color the glass. You have seen cheap window-glass or tumblers which had a greenish tinge. This is due to the presence of iron in the glass. Other substances give different colors. Sometimes another ingredient can be added which will combine with the impurity in such a way that the color is destroyed.

Sand alone, however, will not make clear glass. Some other things must be added. The most important are different forms of soda, lime, lead and potash. The purpose for which the glass is to be used decides which of these and how much is to be mixed with the sand.

In ordinary glassmaking the sand, soda and lime are thoroughly mixed and shoveled into a pot or tank in an intensely hot furnace, together with pieces of broken glass, and lumps of "cullet," which is simply glass which cooled before it was used and became solid in the furnace. This is broken up and melted again. After several hours these materials fuse together. The mixture is not liquid, like water, but it is more like tar or very thick molasses. When colored glass is desired the coloring matter is usually added after the materials have melted. This is not a dye, but some mineral which combines with the glass.

THE PICTURESQUE GLASSBLOWER AND HIS WORK

There are several ways of dealing with molten glass. The picturesque glassblower takes a long tube, sticks it into the pot and collects a lump on the end. Then he blows through the tube and the lump at the end swells out into a globe. By swinging the tube, and by rolling the globe on a block while his assistant shapes the bottom, he can make it take various shapes. Fish-bowls, wine-glasses, and the like are made in this way now. A wine-glass is usually made in three pieces which are stuck together before the glass hardens. The skill of these men is wonderful, and they can make the soft glass take almost any shape. Formerly most window-glass was made by drawing out the globe into a long cylinder, which was then divided, flattened and cut into proper sizes. Now most window-glass is made by machine.

Bottles may be made by inserting the globe on the end of the tube into a mold. The breath of the blower makes the soft glass take the shape of the mold. Machines, however, do this work much more rapidly, and now few bottles are made by the old process. Cheap table glassware is made by taking a lump of soft glass and pressing it into shape as if it were made of putty.

THE CUT GLASS WHICH GLITTERS IN THE LIGHT

The beautiful cut glass you see is first blown thick. Then on grindstones of different sizes the grooves are cut according to a pattern which has been decided upon, after which the articles are polished. Skillful workmen are needed for these processes also, and the risk of breakage is great. Much pressed glass is

HOW THE MATERIALS ARE MELTED TOGETHER

Formerly glass was made more or less by guesswork, and two batches seldom turned out exactly alike. Now a chemist is attached to every large establishment, and he analyzes carefully all the materials and fixes the proportions of each. This man is weighing the exact amount of the substances which are to be mixed with the sand.

This is the back of one of the great furnaces which are made of fire brick and steel. The raw materials are fed from above through the spout, and are then subjected to a very high temperature for several hours.

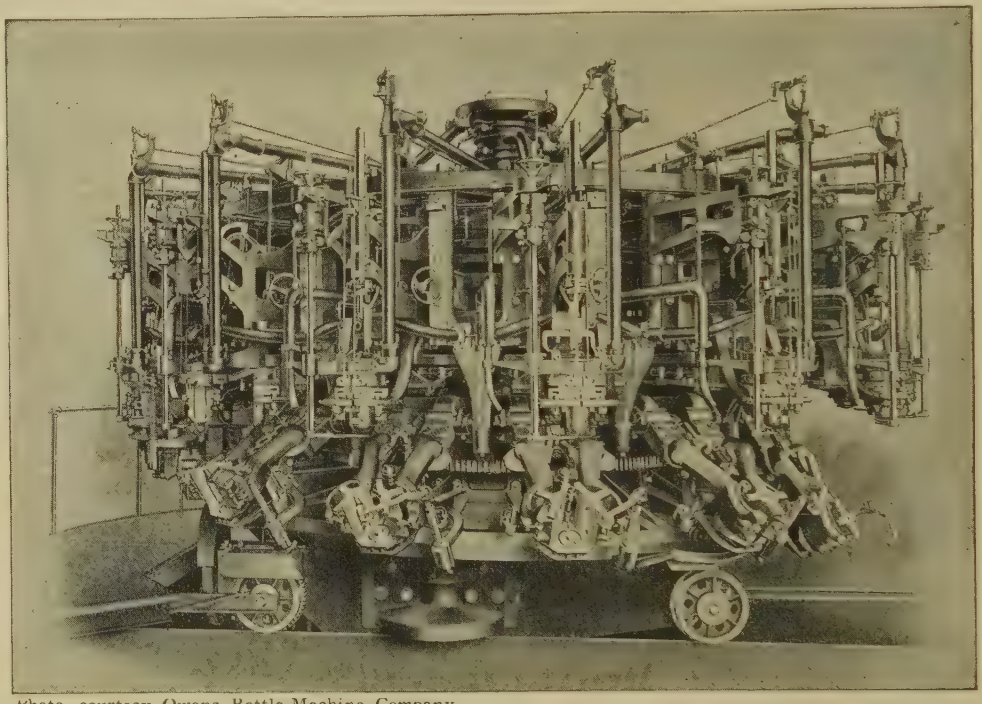
The pictures on this page and page 6749 by courtesy of the Illinois Glass Company.

made to imitate cut glass, but does not have the sparkle of the real article.

There is much more to say about glass. We might speak of wire-glass, which is useful to prevent the spread of fire. Wire netting is imbedded in the panes, or is placed between two sheets while they are still hot, and then they are pressed together. The netting keeps the panes from falling out when struck, or when the heat becomes very great. Some "unbreakable glass" is made by placing a thin sheet of a transparent gummy substance between two sheets of glass and pressing them into one while hot. This glass will crack but will not shatter, and is sometimes used for windshields.

The great, heavy plate glass of the shop windows is made by pouring molten glass upon a firm metal bed. Over this, heavy rollers run until the sheet is of the same thickness in every part. It is then polished and the edges trimmed. Glass for the tops of tables or desks is made in this way. Glass is also used for pavements over cellars underneath the sidewalk. Glass may be spun into a sort of cloth, and tiny threads of glass make a substance known as mineral wool, which is used to make walls rat-proof and fireproof. There is a special kind of glass which looks very much like porcelain.

The story of the manufacture of glass for special uses, such as the lenses for telescopes, opera-glasses and cameras is long and interesting. This glass must be made with great care, for the slightest irregularity of any sort would spoil the whole piece. When perfect pieces have been made lenses must be ground very carefully. A lens for a great telescope costs many thousands of dollars.



Photo, courtesy Owens Bottle-Machine Company.

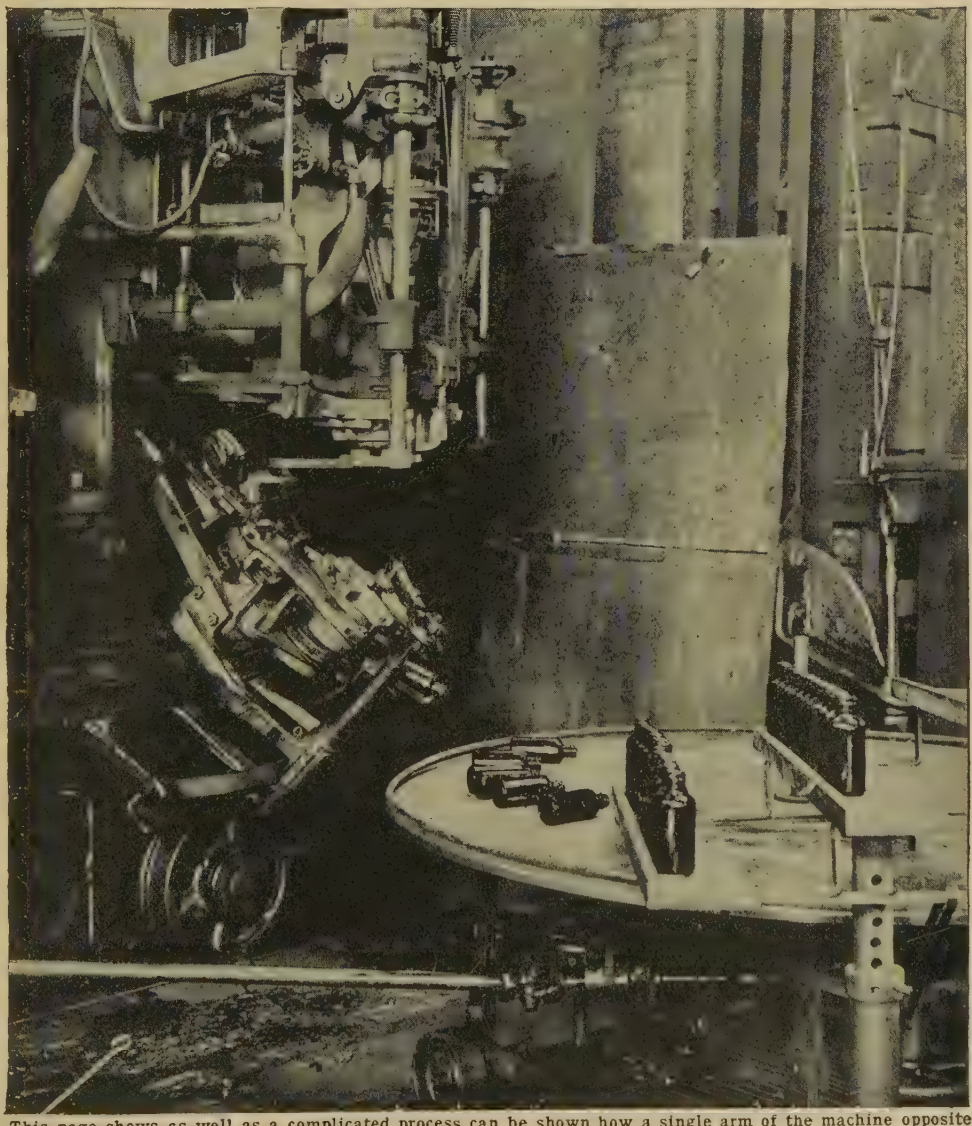
This is a late type of bottle-blowing machine. The machine revolves and each of the fifteen arms in turn sucks up from a furnace not shown in the picture the proper quantity of molten glass to make a bottle of the size desired. By means of compressed air the glass is then forced against the sides of the molds, and a perfect bottle is made without the help of human hands. This machine can make over 40,000 bottles in twenty-four hours. Even more of certain sizes have been made.

The beauties of glass are too numerous to mention. You have seen wonderful vases, plates and cups in the shops with their marvelous colors. Some of these colors are obtained by mixing the coloring in the pot, some by mixing two or more different batches of glass, some by applying coloring matter of enamel after the vase has been shaped and then applying heat. To tell of all these would require a book, instead of a few lines.

THE NEXT STORY OF FAMILIAR THINGS IS ON PAGE 6815.

ONE ARM OF A BOTTLE MACHINE

The many parts of one mold on an Owens machine.



This page shows as well as a complicated process can be shown how a single arm of the machine opposite works. Above are the parts of the mold. Below, the mold which has sucked up molten glass from a furnace and shaped it is throwing out the finished bottle on the table. As the machine revolves, this arm repeats the operation.

MAKING GLOBES FOR GOLDFISH

These pictures show how the globes in which goldfish often live are made. A workman sticks a long tube into a pot of molten glass and brings out a lump. He shapes it slightly and hands it to the blower, who forces his breath through the tube, swinging and rolling the globe. If it grows too cold, he reheats it.

When the globe has reached the proper size, another rod is dipped in melted glass and stuck to the bottom. The globe is then cut from the blowing tube, and you see the second man shaping the mouth of the globe before it has entirely hardened. The rod is then broken away from the bottom, and the rough places ground smooth.

Photos, Brown Bros.

MAKING WINDOW-GLASS AND DEMIJOHNS

Photo, Brown Bros.

Though much window-glass is made by the help of machinery, a great deal is made by this process. A man gathers a lump of glass, just as was shown on the previous page, and shapes it. The next man takes the globe and with wonderful skill, blowing, swinging and reheating, makes it take the form of a cylinder. The ends are then cut off, and the cylinder is split down the middle. It is then flattened out and sent again through a hot chamber. When it comes out it lies flat and is then cut into the exact size desired.

Photo, Underwood & Underwood.

At the left of this picture the two men are blowing and shaping a great demijohn which will hold several gallons when completed. The weight of the glass is so great that one man cannot handle it alone. One blows while the other shapes it on the slab. At the right a man is shaping a great globe.

MIRRORS IN WHICH TO SEE OURSELVES

Formerly plates of metal were used as mirrors. When glass was first used it was given a coat of mercury and tin, but the process was slow and expensive. Now pieces of plate glass are laid on a warm table and a solution of nitrate of silver is carefully poured and spread evenly over their surfaces. The silver reflects more of the rays of light than the mixture formerly used.

Often a second coat of silver is applied. After it has thoroughly dried, a coat of varnish and then one of black paint are spread over the glass. The large plates are then ready to be framed or to be cut into smaller pieces. Only the very finest glass will make a good mirror, and all work must be carefully done.

Photos, Brown Bros.

A MASTERPIECE OF MELODY

THIS poem made the name of the American poet Edgar Allan Poe famous throughout his own land and widely known throughout Europe and the English-speaking world. When we read The Raven we seem to feel the anguish of a strong and loving nature to whom a dear one has but lately been lost. But this is entirely a work of imagination, not of personal feeling. The poem was suggested to Poe by his reading some verses entitled Isadore, in which the refrain was, "Thou art lost to me for ever, Isadore." Isadore was written by an American author, long since forgotten, to express the emotion he imagined one would feel at the loss of a loved one, not because he was really in sorrow. Thus Edgar Allan Poe's famous poem was suggested to him by a poem which was also purely an effort of imagination. The raven he introduced from having been impressed by Grip, the talkative raven in Barnaby Rudge.

THE RAVEN

CONTINUED FROM 6653

ONCE upon a midnight dreary, while I pondered, weak and weary,
Over many a quaint and curious volume of forgotten lore—
While I nodded, nearly napping, suddenly there came a tapping,
As of someone gently rapping—rapping at my chamber door.
"'Tis some visitor," I muttered, "tapping at my chamber door—
Only this and nothing more."

Ah, distinctly I remember it was in the bleak December,
And each separate dying ember wrought its ghost upon the floor.
Eagerly I wished the morrow;—vainly I had sought to borrow
From my books surcease of sorrow—sorrow for the lost Lenore—
For the rare and radiant maiden whom the angels name Lenore—
Nameless here for evermore.

And the silken, sad, uncertain rustling of each purple curtain
Thrilled me—filled me with fantastic terrors never felt before;
So that now, to still the beating of my heart, I stood repeating,
"'Tis some visitor entreating entrance at my chamber door—
Some late visitor entreating entrance at my chamber door—
This it is and nothing more."

Presently my soul grew stronger; hesitating then no longer,
"Sir," said I, "or Madam, truly your forgiveness I implore;
But the fact is I was napping, and so gently you came rapping,
And so faintly you came tapping—tapping at my chamber door,
That I scarce was sure I heard you"—here I opened wide the door—
Darkness there and nothing more.

Deep into that darkness peering, long I stood there, wondering, fearing,
Doubting, dreaming dreams no mortal ever dared to dream before;
But the silence was unbroken, and the stillness gave no token,
And the only word there spoken was the whispered word, "Lenore!"
This I whispered, and an echo murmured back the word, "Lenore!"—
Merely this and nothing more.

Back into the chamber turning, all my soul within me burning,
Soon again I heard a tapping somewhat louder than before.
"Surely," said I, "surely that is something at my window lattice;
Let me see, then, what thereat is, and this mystery explore—
Let my heart be still a moment, and this mystery explore;—
'Tis the wind and nothing more!"

Open here I flung the shutter, when, with many a flirt and flutter,
In there stepped a stately Raven of the saintly days of yore.
Not the least obeisance made he; not a minute stopped or stayed he;
But, with mien of lord or lady, perched above my chamber door—
Perched upon a bust of Pallas, just above my chamber door—
Perched and sat, and nothing more.

Then this ebony bird beguiling my sad fancy into smiling,
By the grave and stern decorum of the countenance it wore,
"Though thy crest be shorn and shaven, thou," I said, "art sure no craven,
Ghastly, grim and ancient Raven wandering from the Nightly shore—
Tell me what thy lordly name is on the Night's Plutonian shore!"
Quoth the Raven, "Nevermore!"

Much I marvelled this ungainly fowl to hear
discourse so plainly,
Though its answer little meaning—little
relevancy bore;
For we cannot help agreeing that no living
human being
Ever yet was blessed with seeing bird above
his chamber door—
Bird or beast upon the sculptured bust above
his chamber door,
With such a name as "Nevermore."

But the Raven, sitting lonely on the placid
bust, spoke only
That one word, as if his soul in that one
word he did outpour.
Nothing further then he uttered—not a
feather then he fluttered—
Till I scarcely more than muttered, "Other
friends have flown before—
On the morrow *he* will leave me, as my Hopes
have flown before."
Then the bird said, "Nevermore."

Startled at the stillness broken by reply so
aptly spoken,
"Doubtless," said I, "what it utters is its
only stock and store,
Taught from some unhappy master whom
unmerciful Disaster
Followed fast and followed faster till his
songs one burden bore—
Till the dirges of his Hope that melancholy
burden bore
Of 'Never-nevermore.'"

But the Raven still beguiling all my fancy
into smiling,
Straight I wheeled a cushioned seat in front
of bird, and bust and door;
Then, upon the velvet sinking, I betook my-
self to linking
Fancy unto fancy, thinking what this omi-
nous bird of yore,
What this grim, ungainly, ghastly, gaunt, and
ominous bird of yore
Meant in croaking "Nevermore."

This I sat engaged in guessing, but no syl-
lable expressing
To the fowl whose fiery eyes now burned into
my bosom's core;
This and more I sat divining, with my head
at ease reclining
On the cushion's velvet lining that the lamp-
light gloated o'er,
But whose velvet violet lining, with the lamp-
light gloating o'er,
She shall press, ah, nevermore!

Then, methought, the air grew denser, per-
fumed from an unseen censer
Swung by Seraphim whose foot-falls tinkled
on the tufted floor.
"Wretch," I cried, "thy God hath lent thee—
by these angels He hath sent thee
Respite—respite and nepenthe from thy
memories of Lenore!
Quaff, oh quaff this kind nepenthe, and for-
get this lost Lenore!"
Quoth the Raven, "Nevermore."

"Prophet!" said I, "thing of evil!—prophet
still, if bird or devil!
Whether Tempter sent, or whether tempest
tossed thee here ashore,
Desolate yet all undaunted, on this desert
land enchanted—
On this home by Horror haunted—tell me
truly, I implore—
Is there—*is* there balm in Gilead?—tell me—
tell me, I implore!"
Quoth the Raven, "Nevermore."

"Prophet!" said I, "thing of evil!—prophet
still, if bird or devil!
By that Heaven that bends above us—by
that God we both adore—
Tell this soul with sorrow laden if, within the
distant Aidenn,
It shall clasp a sainted maiden whom the
angels name Lenore—
Clasp a rare and radiant maiden whom the
angels name Lenore."
Quoth the Raven, "Nevermore."

"Be that word our sign of parting, bird or
fiend!" I shrieked, upstarting—
"Get thee back into the tempest and the
Night's Plutonian shore!
Leave no black plume as a token of that lie
thy soul hath spoken!
Leave my loneliness unbroken!—quit the bust
above my door!
Take thy beak from out my heart, and take
thy form from off my door!"
Quoth the Raven, "Nevermore."

And the Raven, never flitting, still is sitting,
still is sitting
On the pallid bust of Pallas, just above my
chamber door;
And his eyes have all the seeming of a de-
mon's that is dreaming,
And the lamp-light o'er him streaming
throws his shadow on the floor;
And my soul from out that shadow that lies
floating on the floor
Shall be lifted—nevermore!

THE HOUSEKEEPER

This quaintly humorous description of the snail was written by Charles Lamb, and it is in simple verses such as these that we can detect the sympathy of the poet with the lowliest creatures of God's creation.

THE frugal snail, with forecast of repose,
Carries his house with him where'er he
goes;
Peeps out—and if there comes a shower of
rain,
Retreats to his small domicile again.
Touch but a tip of him, a horn—'tis well—
He curls up in his sanctuary shell.
He's his own landlord, his own tenant; stay
Long as he will, he dreads no quarter day.
Himself he boards and lodges; both invites
And feasts himself; sleeps with himself o'
nights.
He spares the upholsterer trouble to procure
Chattels; himself is his own furniture,
And his sole riches. Wheresoe'er he roam,
Knock when you will—he's sure to be at
home.

AHAB MOHAMMED

Poets often turn to the rich legends of the East for inspiring themes. Few of these stories are more attractive than that of Ahab Mohammed, by James Matthew Legaré.

A PEASANT stood before a king and said:
"My children starve, I come to thee for bread."
On cushions soft and silken sat enthroned
The king, and looked on him that prayed and moaned,
Who cried again: "For bread I come to thee!"
For grief, like wine, the tongue will render free.
Then said the prince with simple truth:
"Behold
I sit on cushions silken-soft, of gold
And wrought with skill the vessels which they bring
To fitly grace the banquet of a king.
But at my gate the Mede triumphant beats,
And die for food my people in the streets.
Yet no good father hears his child complain
And gives him stones for bread, for alms disdain.
Come, thou and I will sup together—come!"
The wondering courtiers saw—saw and were dumb:
Then followed with their eyes where Ahab led
With grace the humble guest, amazed, to share his bread.
Him half abashed the royal host withdrew
Into a room, the curtained doorway through.
Silent behind the folds of purple closed,
In marble life the statues stood disposed;
From the high ceiling, perfume breathing, hung
Lamps rich, pomegranate-shaped, and golden-swung.
Gorgeous the board with massive metal shone,
Gorgeous with gems arose in front a throne:
These through the Orient lattice saw the sun,
If gold there was, of meat and bread was none
Save one small loaf; this stretched his hand and took
Ahab Mohammed, prayed to God, and broke:
One half his yearning nature bid him crave,
The other gladly to his guest he gave.
"I have no more to give," he cheerily said:
"With thee I share my only loaf of bread."
Humbly the stranger took the offered crumb
Yet ate not of it, standing meek and dumb;
Then lifts his eyes,—the wondering Ahab saw
His rags fall from him as the snow in thaw.
Resplendent, blue, those orbs upon him turned;
All Ahab's soul within him throbbed and burned.
"Ahab Mohammed," spoke the vision then,
"From this thou shalt be blessèd among men.
Go forth—thy gates the Mede bewildered flees,
And Allah thank thy people on their knees.
He who gives somewhat does a worthy deed,
Of him the Recording Angel shall take heed.
But he that halves all that his house doth hold,
His deeds are more to God, yea, more than finest gold!"

SPEAK GENTLY

This is a very old lesson in conduct, which has seen service in many children's books for fifty years or more. As a moral lesson in rhyme it is still worthy of repetition. It was probably written by David Bates, an American poet who lived and worked in Philadelphia about the middle of the last century.

SPEAK gently!—It is better far
To rule by love than fear—
Speak gently—let not harsh words mar
The good we might do here!

Speak gently!—love doth whisper low
The vows that true hearts bind;
And gently Friendship's accents flow—
Affection's voice is kind.

Speak gently to the little child!
Its love be sure to gain;
Teach it in accents soft and mild,
It may not long remain.

Speak gently to the young, for they
Will have enough to bear;
Pass through this life as best they may,
'Tis full of anxious care!

Speak gently to the aged one,
Grieve not the careworn heart;
The sands of life are nearly run,
Let such in peace depart.

Speak gently, kindly to the poor—
Let no harsh tone be heard;
They have enough they must endure
Without an unkind word!

Speak gently to the erring—know
They may have toiled in vain;
Perchance unkindness made them so;
Oh, win them back again!

A LIFE-LESSON*

James Whitcomb Riley was one of the most charming of all of the American poets, and none, except the late Eugene Field, has equaled him in his poems of child-life. The following, however, is not exactly a children's poem, but is a tender little study of one who grows up to meet unhappiness, and a reminder that the joys this world takes away are small compared with those the truly religious life has to offer us.

THERE! little girl, don't cry!
They have broken your doll, I know;
And your tea-set blue,
And your play-house, too,
Are things of the long ago;
But childish troubles will soon pass by.—
There! little girl, don't cry!

There! little girl, don't cry!
They have broken your slate, I know;
And the glad, wild ways
Of your school-girl days
Are things of the long ago;
But life and love will soon come by.—
There! little girl, don't cry!

There! little girl, don't cry!
They have broken your heart, I know;
And the rainbow gleams
Of your youthful dreams
Are things of the long ago;
But Heaven holds all for which you sigh.—
There! little girl, don't cry!

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NURSERY RHYMES FOR CHILDREN OF FRANCE

Every country has its own nursery rhymes, for little folks must be amused with merry or quaint verses, though they are English, French or German. Nursery rhymes are very much alike all the world over, so far as their ideas are concerned, even if their words look like none we have ever seen or heard before. Here are three French nursery rhymes, with their English versions. So many boys and girls know French that many of our readers may be able to understand the rhymes in the original language; but it is not easy to turn the French rhymes into English rhymes and keep the original meaning, as has been done here.

LA BERGERE

Il était une bergère,
Et ron, ron, ron, petit patapon.
Il était une bergère
Qui gardait ses moutons,
Ron, ron,
Qui gardait ses moutons.

Elle fit un fromage,
Et ron, ron, ron, petit patapon.
Elle fit un fromage
Du lait de ses moutons,
Ron, ron,
Du lait de ses moutons.

Le chat qui la regarde,
Et ron, ron, ron, petit patapon.
Le chat qui la regarde
D'un petit air fripon,
Ron, ron,
D'un petit air fripon.

Si tu y mets la patte,
Et ron, ron, ron, petit patapon.
Si tu y mets la patte
Tu auras du bâton,
Ron, ron,
Tu auras du bâton.

Il n'y mit pas la patte,
Et ron, ron, ron, petit patapon.
Il n'y mit pas la patte,
Il y mit le menton,
Ron, ron,
Il y mit le menton!

RAMENE TES MOUTONS

La plus aimable à mon gré
Je vais vous la présenter.
Nous lui ferons passer barrière.
"Ramène tes moutons, bergère;
Ramène, ramène, ramène, donc,
Tes moutons à la maison."

LES PETITS BATEAUX

"Papa, les petits bateaux,
Qui vont sur l'eau,
Ont-ils des jambes?"
"Mais oui, petit bêta,
S'ils n'en avaient pas,
Ils ne marcheraient pas!"

THE SHEPHERDESS

A dainty shepherd maiden,
And cheep, cheep, cheep, little patapeep.
A dainty shepherd maiden
Was watching by her sheep,
Cheep, cheep,
Was watching by her sheep.

She made a lovely cheese once,
And cheep, cheep, cheep, little patapeep.
She made a lovely cheese once
Of milk from her kind sheep,
Cheep, cheep,
Of milk from her kind sheep.

Her cat looks up demurely,
And cheep, cheep, cheep, little patapeep.
Her cat looks up demurely,
Then quick pretends to sleep,
Cheep, cheep,
Then quick pretends to sleep.

Don't dare put in your paw, Puss,
And cheep, cheep, cheep, little patapeep.
Don't dare put in your paw, Puss,
Or you'll not be let off cheap,
Cheep, cheep,
Or you'll not be let off cheap.

Good Pussy kept her paw out,
And cheep, cheep, cheep, little patapeep.
Good Pussy kept her paw out,
But dipped her chin in deep,
Cheep, cheep,
But dipped her chin in deep.

BRING BACK YOUR SHEEP

I'll introduce—just wait a while—
A charming maiden by yon stile.
"Ho! pass this way," aloud we'll mock;
"Shepherdess, lead back your flock;
Lead back, lead back, as you are told,
Your pretty sheep within the fold."

THE LITTLE BOAT

"Dad, has a boat,
Sailing afloat,
Got two legs like me?"
"Yes, little zany,
If it hadn't any,
It couldn't move, you see!"

THE TALES OF CAPTAIN MARRYAT

CAPTAIN FREDERICK MARRYAT was born in London on July 10, 1792, and died in Norfolk, August 9, 1848. He was a naval officer who won fame as a writer of stories of the sea which are full of high spirits. The salt spray seems to blow through them, so true are they to life. Midshipman Easy, Masterman Ready, Peter Simple and Jacob Faithful are all fine stories. Masterman Ready was written by Captain Marryat to entertain and instruct his own children, who had been so delighted with The Swiss Family Robinson that they wanted their father to continue it. Marryat found that the seamanship of that story and the natural description of the island were all wrong, so that he preferred to write an entirely new story. This we have in Masterman Ready, or the Wreck of the Pacific, a book which takes its place by the side of Robinson Crusoe.

MASTERMAN READY

CONTINUED FROM 6582

WHEN we first meet Masterman Ready he is a weather-beaten old seaman on board the big ship Pacific in the middle of the Atlantic. Ready had been more than fifty years at sea. When he was ten he had been bound apprentice on a coal ship that sailed from South Shields. Afterward he served many years on a man-of-war.

Though he had been in every climate, he was still hale and active. In cases of difficulty and danger the captain would not hesitate to ask Ready's opinion, and frequently took his advice. On the Pacific he was second mate. This vessel was on her way to New South Wales with a valuable cargo of English hardware and cutlery.

In addition to the crew, there was on board a family by the name of Seagrave. These were the only passengers. Mr. Seagrave had for many years held an office under Government in Sydney. He was the owner of some valuable property, and was now on his return to the colony with a variety of articles for the improvement of his estate. He was a clever man, but given to talking rather than doing. Mrs. Seagrave was an amiable woman, not in the most robust health. William, the eldest boy, was clever and steady, and soon made friends with Masterman Ready. The sailor promised to tell him how he was once wrecked, in return for the story of Robinson Crusoe, of which he had never heard. Thomas, who was six years old, was a good-tempered boy, full of mischief, and always in a scrape. The two other children were Caroline, a girl of seven, and Albert, a little fellow, who, at the opening of the story, was not yet one year old. Albert was under the care of a good-natured black girl named Juno. The party had with them two shepherd's dogs named Romulus and Remus. There was also on board a little terrier, the favorite of the captain.

Soon after leaving the Cape the vessel encountered a terrific gale which lasted some days. Several men were lost. Captain Osborn was rendered senseless by falling wreckage, and the ship began to leak badly.

When the captain was disabled, the sailors no longer felt themselves under control. They made up their minds to abandon the vessel and the passengers, and take their chance in the one boat that had been left undamaged by the gale. Old Ready decided to remain with the Seagraves; and, despite all the arguments of the other sailors, remain he did. Happily, the weather continued fair, after the crew had left the vessel, until they sighted an island, and Ready ran the Pacific aground. His next thought was to repair the small boat that had been left to them.

"And when we get on shore?" queried Mr. Seagrave.

"Why," answered Ready, "where there are cocoa-nut trees in such plenty as there are on that island there is no fear of starvation, even if we had not the ship's provisions. I expect a little difficulty with regard to water, for the island is low—very low and small—but we cannot expect to find everything exactly as we wish."

MASTERMAN READY GIVES GOOD ADVICE TO A GENTLEMAN IN DISTRESS

"I am thankful to the Almighty for our preservation, Ready; but still, there are feelings which I cannot get over. Here we are, cast away on a desolate island which perhaps no ship may ever come near, so that there is little chance of our being taken off. Here we may live and die, here my children may grow up—yes, grow old, after they have buried you, their father and their mother, and follow us to the same tomb. All their prospects in life, all mine, are blasted, all my hopes overthrown. It is a melancholy and cruel fate, Ready, and that you must acknowledge."

"Mr. Seagrave, as an old man compared to you, I may venture to say that you are ungrateful to Heaven to give way to these repinings. What is said in the Book of Job? 'Shall we receive good of the Lord, and shall we not receive evil?' Besides, who knows whether good may not proceed from what appears evil?"

"You have reproved me very justly, Ready, and I thank you for it," replied Mr. Seagrave. "I will repine no more, but make the best of it."

MASTERMAN READY IS ASKED TO COMMAND THE PARTY

"And trust in God, sir, who, if He thinks fit, will restore you once more to your friends, and increase tenfold your flocks and herds."

"That quotation comes very apt, Ready," replied Mr. Seagrave, smiling, "considering that all my prospects are in flocks and herds upon my land in New South Wales. I must put myself under your orders, for in our present position you are my superior—knowledge is power."

On landing, Ready and Mr. Seagrave decided to fix up a tent by a beautiful sandy cove a quarter of a mile away. In addition to the three dogs, it may be mentioned that the live stock they had with them included two goats and a kid, several pigs, three or four pigeons, a cow, and a Merino ram and sheep. Juno proved very useful in the preparations for the encampment; but Master Tommy was soon in mischief. A musket, loaded, had been taken on shore and placed against a tree. When no one was looking the boy pulled the trigger!

Ready, who was on the wreck with Mrs. Seagrave, pulled ashore as soon as he could with another musket, and in a great state of alarm. He found Mr. Seagrave and Juno busy with the tent, and Master Tommy sitting on the ground crying very lustily. It appeared that when the musket went off, its muzzle pointing upward, the shot brought down two large cocoa-nuts, which fell close to where Tommy was, under the tree. Had they hit him they would certainly have killed him. Mr. Seagrave, conscious of the alarm the shot would cause on the vessel, had been scolding him soundly, and the tears were shed to prove repentance. The incident is given as an example of the mischief Master Tommy was capable of making.

PREPARATIONS FOR DEFENSE AGAINST THE COMING OF THE SAVAGES

William and Ready, with the aid of the dogs, found water below the sand on another part of the island, and near here it was decided to build a house. When they had been on the island some time, Ready told the story of his life. They were all very happy together until the escape of two black women who had arrived in an exhausted condition on the island and whom they had befriended. Then there was a feeling of alarm at what might follow. They built a stockade and prepared themselves against attack. One day their hopes of release mounted high, for a vessel was sighted. The flag of the Pacific was hoisted aloft, but apparently this was not seen.

Then, one day, the long-expected danger showed itself. A large number of canoes laden with savages were seen approaching. About this time William thought he saw another vessel under sail. The savages, after devoting themselves to the old house, came up to the stockade. Happily the garrison were prepared. Juno handed up the muskets, which Mr. Seagrave, Ready and William used to advantage. There was a fierce combat for an hour, when the savages drew off.

Taken directly from the book, here we give an account of the death of Ready.

THE DEATH OF READY

"DO you think they will go away now?" said Mrs. Seagrave.

"Oh, no, madam, not yet; they will try us every way before they leave us. You see these are very brave men, and it is clear that they know what gunpowder is, or they would have been more astonished."

"I should think so too," replied Mr. Seagrave; "the first time that savages hear the report of fire-arms, they are usually thrown into great consternation."

"Yes, sir; but such has not been the case with these people, and therefore I reckon it is not the first time that they have fought with Europeans."

"Are they all gone, Ready?" said William, who had come down from the plank to his mother.

"No, sir; I see them between the trees now; they are sitting round in a circle, and, I suppose, making speeches: it's the custom of these people."

"Well, I'm very thirsty, at all events," said William; "Juno, bring me a little water."

Juno went to the water-tub, to comply with William's request, and in a few moments afterwards came back in great consternation.

"Oh, Massa! oh, Missy! no water; water all gone."

"Water all gone!" cried Ready and all of them in a breath.

"Yes; not one little drop in the cask."

"I filled it up to the top!" exclaimed Ready very gravely; "the tub did not leak, that I am sure of; how can this have happened?"

"Missy, I tink I know now," said Juno; "you remember you send Massa Tommy, the two or three days we wash, to fetch water from well in little bucket. You know how soon he come back, and how you say what good boy he was, and how you tell Massa Seagrave when he come to dinner. Now, Missy, I quite certain Massa Tommy no take trouble go to well, but fetch water from tub all the while, and so he empty it."

"I'm afraid you're right, Juno," replied Mrs. Seagrave. "What shall we do?"

"I go speak Massa Tommy," said Juno, running to the house.

"This is a very awkward thing, Mr. Seagrave," observed Ready gravely.

Mr. Seagrave shook his head.

The fact was, that they all perceived the danger of their position: if the savages did not leave the island, they would perish of thirst or have to surrender; and in the latter case, all their lives would most certainly be sacrificed.

Juno now returned: her suspicions were but too true. Tommy, pleased with the praise of being so quick in bringing the water, had taken out the spigot of the cask, and drawn it all off. He was now crying, and promising not to take the water again.

"His promises come too late," observed Mr. Seagrave; "well, it is the will of Heaven that all our careful arrangements and preparations against this attack should be defeated by the idleness of a child, and we must submit."

"Very true, sir," replied Ready; "all our hopes now are, that the savages may be tired out, and leave the island."

"If I had but a little for the children, I should not care," observed Mrs. Seagrave; "but to see those poor things suffer —is there not a drop left, Juno?"

Juno shook her head. "All gone, Missy; none nowhere."

Mrs. Seagrave said she would go and examine, and went away into the house accompanied by Juno.

"This is a very bad business, Ready," observed Mr. Seagrave. "What would we give for a shower of rain now, that we might catch the falling drops!"

"There are no signs of it, sir," replied Ready; "we must, however, put our confidence in One who will not forsake us."

"I wish the savages would come on again," observed William; "for the sooner they come, the sooner the affair will be decided."

"I doubt if they will to-day, sir; at night-time I think it very probable, and I fear the night attack more than the day. We must make preparations for it."

"Why, what can we do, Ready?"

"In the first place, sir, by nailing planks from cocoa-nut tree to cocoa-nut tree above the present stockade, we may make a great portion of it much higher, and more difficult to climb over. Some of them were nearly in, this time. If we do that, we shall not have so large a space to watch over and defend; and then we must contrive to have a large fire ready for lighting, that we may not have to fight altogether in the dark. It will give them

some advantage in looking through the palisades, and seeing where we are, but they cannot well drive their spears through, so it is no great matter. We must make the fire in the centre of the stockade, and have plenty of tar in it, to make it burn bright, and we must not, of course, light it until after we are attacked. We shall then see where they are trying for an entrance, and where to aim with our muskets."

"The idea is very good, Ready," said Mr. Seagrave; "if it had not been for this unfortunate want of water, I really should be sanguine of beating them off."

"We may suffer very much, Mr. Seagrave, I have no doubt; but who knows what the morrow may bring forth?"

"True, Ready. Do you see the savages now?"

"No, sir; they have left the spot where they were in consultation, and I do not even hear them; I suppose they are busy with their wounded and their dead."

As Ready had supposed, no further attack was made by the savages on that day, and he, William, and Mr. Seagrave were very busy making their arrangements; they nailed the planks on the trunks of the trees above the stockade, so as to make three sides of the stockade at least five feet higher, and almost impossible to climb up; and they prepared a large fire in a tar-barrel full of cocoa-nut leaves mixed with wood and tar, so as to burn fiercely. Dinner or supper they had none, for there was nothing but salt pork and beef and live turtle, and, by Ready's advice, they did not eat, as it would only increase their desire to drink.

The poor children suffered much; little Albert wailed and cried for "water, water;" Caroline knew that there was none, and was quiet, poor little girl, although she suffered much; as for Tommy, the author of all this misery, he was the most impatient, and roared for some time till William, quite angry at his behaviour, gave him a smart box on the ear, and he reduced his roar to a whimper, from fear of receiving another. Ready remained on the look-out; indeed, everything was so miserable inside of the house, that they were all glad to go out of it; they could do no good, and poor Mrs. Seagrave had a difficult and most painful task to keep the children quiet under such severe privation, for the weather was still very warm and sultry.

But the moaning of the children was very soon after dusk drowned by the yells of the savages, who, as Ready had prognosticated, now advanced to the night attack.

Every part of the stockade was at once assailed, and their attempts now made were to climb into it; a few spears were occasionally thrown, but it was evident that the object was to obtain an entrance by dint of numbers. It was well that Ready had taken the precaution of nailing the deal planks above the original stockade, or there is little doubt but that the savages would have gained their object; as it was, before the flames of the fire, which Juno had lighted by Ready's order, gave them sufficient light, three or four savages had climbed up and had been shot by William and Mr. Seagrave, as they were on the top of the stockade.

When the fire burnt brightly, the savages outside were more easily aimed at, and a great many fell in their attempts to get over. The attack continued more than an hour, when at last, satisfied that they could not succeed, the savages once more withdrew, carrying with them as before their dead and wounded.

"I trust that they will now re-embark, and leave the island," said Mr. Seagrave to Ready.

"I only wish they may, sir; it is not at all impossible; but there is no saying. I have been thinking, Mr. Seagrave, that we might be able to ascertain their movements by making a look-out. You see, sir, that cocoa-nut tree," continued Ready, pointing to one of those to which the palisades were fastened, "is much taller than any of the others: now, by driving spike-nails into the trunk at about a foot apart, we might ascend it with ease, and it would command a view of the whole bay; we then could know what the enemy were about."

"Yes, that is very true; but will not any one be very much exposed if he climbs up?"

"No, sir, for you see the cocoa-nut trees are cut down clear of the palisades to such a distance, that no savage could come at all near without being seen by any one on the look-out, and giving us sufficient time to get down again before he could use his spear."

"I believe that you are right there, Ready, but at all events I would not attempt to do it before daylight, as there

may be some of them still lurking underneath the stockade."

"Certainly, there may be, sir, and therefore, until daylight, we will not begin. Fortunately, we have plenty of spike-nails left."

Mr. Seagrave then went into the house; Ready desired William to lie down, and sleep for two or three hours, as he would watch. In the morning, when Mr. Seagrave came out, he would have a little sleep himself.

"I can't sleep, Ready. I'm mad with thirst," replied William.

"Yes, sir; it's very painful—I feel it myself very much, but what must those poor children feel? I pity them most."

"I pity my mother most, Ready," replied William; "it must be agony to her to witness their sufferings, and not be able to relieve them."

"Yes, indeed, it must be terrible, Master William, to a mother's feelings; but, perhaps, these savages will be off to-morrow, and then we shall forget all our privations."

"I trust in God that they may, Ready, but they seem very determined."

"Yes, sir; iron is gold to them, and what will civilized men not do for gold? Come, Master William, lie down at all events, even if you cannot sleep."

In the meantime, Mr. Seagrave had gone into the house. He found the children still crying for water, notwithstanding the coaxing and soothing of Mrs. Seagrave, who was shedding tears as she hung over poor little Albert. Juno had gone out, and had dug with a spade as deep as she could with a faint hope that some might be found, but in vain, and she had just returned mournful and disconsolate. There was no help for it but patience; and patience could not be expected in children so young. Little Caroline only drooped, and said nothing. Mr. Seagrave remained for two or three hours with his wife, assisting her in pacifying the children, and soothing her to the utmost of his power; at last he went out and found old Ready on the watch.

"Ready, I had rather a hundred times be attacked by these savages, and have to defend this place, than be in that house for even five minutes and witness the sufferings of my wife and children."

"I do not doubt it, sir," replied Ready; "but cheer up, and let us hope for the best; I think it very probable that the savages after this second defeat will leave the island."

"I wish I could think so, Ready; it would make me very happy; but I have come out to take the watch, Ready. Will you not sleep for a while?"

"I will, sir, if you please, take a little sleep. Call me in two hours; it will then be daylight, and I can go to work, and you can get some repose yourself."

"I am too anxious to sleep; I think so, at least."

"Master William said he was too thirsty to sleep, sir, but, poor fellow, he is now fast enough."

"I trust that boy will be spared, Ready."

"I hope so too; for he is a noble fellow: but we are all in the hands of the Almighty. Good-night, sir."

"Good-night, Ready."

Mr. Seagrave took his station on the plank, and was left to his own reflections; that they were not of the most pleasant kind, may easily be imagined. He had, however, been well schooled by adversity, and had lately brought himself to such a frame of mind, as to bow in submission to the will of Heaven, whatever it might be. He prayed earnestly and fervently that they might be delivered from the danger and sufferings which threatened them, and became calm and tranquil; prepared for the worst, if the worst was to happen, and confidently placing himself and his family under the care of Him who orders all as He thinks best.

At daylight Ready woke up and relieved Mr. Seagrave, who did not return to the house, but lay down on the cocoa-nut boughs where Ready had been lying by the side of William. As soon as Ready had got out the spike-nails and hammer, he summoned William to his assistance, and they commenced driving them into the cocoa-nut tree, one looking out in case of the savages approaching, while the other was at work. In less than an hour they had gained the top of the tree close to the boughs, and had a very commanding view of the bay, as well as inland. William, who was driving the last dozen spikes, took a survey, and then came down to Ready.

"I can see everything, Ready: they have pulled down the old house altogether, and are most of them lying down outside, covered up with their war cloaks; some women are walking to and fro from the

canoes, which are lying on the beach where they first landed."

"They have pulled down the house to obtain the iron nails, I have no doubt," replied Ready. "Did you see any of their dead?"

"No; I did not look about very much, but I will go up again directly. I came down because my hands were jarred with hammering, and the hammer was so heavy to carry. In a minute or two I shall go up light enough. My lips are burning, Ready, and swelled; the skin is peeling off. I had no idea that want of water would have been so dreadful. I think poor Tommy is more than punished already."

"A child does not reflect upon consequences, Master William, nor could we possibly foresee that his using up the water could have created such misery. It was an idle trick of his, and whatever may be the consequences, it still can be considered as such and nothing more."

"I was in hopes of finding a cocoa-nut or two on the tree, but there was not one."

"And if you had found one, it would not have had any milk in it at this season of the year. However, Master William, if the savages do not go away to-day, something must be done. I wish now that you would go up again, and see if they are not stirring."

William again mounted to the top of the tree, and remained up for some minutes; when he came down, he said, "They are all up now, and swarming like bees. I counted 260 of the men in their war-cloaks and feather head-dresses; the women are passing to and fro from the well with water; there is nobody at the canoes except eight or ten women, who are beating their heads, I think, or doing something of the kind. I could not make it out well, but they seem all doing the same thing."

"I know what they are about, Master William: they are cutting themselves with knives or other sharp instruments. It is the custom of these people. The dead are all put into the canoes, and these women are lamenting over them; perhaps they are going away, since the dead are in the canoes, but there is no saying."

The second day was passed in keeping a look-out upon the savages, and awaiting a fresh attack. They could perceive from the top of the cocoa-nut tree that the savages held a council of war in the forenoon, sitting round in a large circle, while one got up in the centre, and made a speech, flourishing his club and spear while he spoke. In the afternoon the council broke up, and the savages were observed to be very busy in all directions, cutting down the cocoa-nut trees, and collecting all the brushwood.

Ready watched them for a long while, and at last came down a little before sunset. "Mr. Seagrave," said he, "we shall have, in my opinion, no attack this night, but to-morrow we must expect something very serious; the savages are cutting down the trees, and making large faggots; they do not get on very fast, because their hatchets are made of stone and don't cut very well, but perseverance and numbers will effect everything, and I daresay that they will work all night till they have obtained as many faggots as they want."

"But what do you imagine to be their object, Ready, in cutting down trees, and making the faggots?"

"Either, sir, to pile them up outside the palisades, so large as to be able to walk up upon them, or else to pile them up to set fire to them, and burn us out."

"Do you think they will succeed?"

"Not without very heavy loss; perhaps we may beat them off, but it will be a hard fight; harder than any we have had yet. We must have the women to load the muskets, so that we may fire as fast as we can. I should not think much of their attempts to burn us, if it were not for the smoke. Cocoa-nut wood, especially with the bark on, as our palisades have, will char a long while, but not burn easily when standing upright; and the fire, when the faggots are kindled, although it will be fierce, will not last long."

"But suffering as we are now, Ready, for want of water, how can we possibly keep up our strength to meet them in a suffocating smoke and flame; we must drop with sheer exhaustion."

"We must hope for the best, and do our best, Mr. Seagrave," replied Ready; "and recollect that should anything happen to me during the conflict, that if there is any chance of your being overpowered, you must take advantage of the smoke, to escape into the woods, and find your way to the tents. I have no doubt that you will be able to do that;

of course the attack will be to windward, if they use fire, and you must try and escape to leeward; I have shown William how to force a palisade if necessary. The savages, if they get possession, will not think of looking for you at first, and, perhaps, when they have obtained all that the house contains, not even afterwards."

"Why do you say if any accident happens to you, Ready?" said William.

"Because, Master William, if they place the faggots so as to be able to walk to the top of the palisades, I may be wounded or killed, and so may you."

"Of course," replied William; "but they are not in yet, and they shall have a hard fight for it."

Ready then told Mr. Seagrave that he would keep the watch, and call him at twelve o'clock. During these two days, they had eaten very little; a turtle had been killed, and pieces fried, but eating only added to their thirst, and even the children refused the meat. The sufferings were now really dreadful.

As soon as Mr. Seagrave had gone into the house, Ready called William, and said, "Master William, water we must have. I cannot bear to see the agony of the poor children, and the state of mind which your poor mother is in; and more, without water we never shall be able to beat off the savages to-morrow. We shall literally die of choking in the smoke, if they use fire. Now, William, I intend to take one of the seven-gallon barricos, and go down to the well for water. I may succeed, and I may not, but attempt it I must, and if I fall it cannot be helped."

"Why not let me go, Ready?" replied William.

"For many reasons, William," said Ready; "and the chief one is that I do not think you would succeed so well as I shall. I shall put on the war-cloak and feathers of the savage who fell dead inside of the stockade, and that will be a disguise, but I shall take no arms except his spear, as they would only be in my way, and increase the weight I have to carry. Now observe, you must let me out of the door, and when I am out, in case of accident, put one of the poles across it inside; that will keep the door fast, if they attack it, until you can secure it with the others. Watch my return, and be all ready to let me in. Do you understand me?"

"Yes, perfectly, Ready; but I am now, I must confess, really frightened; if anything was to happen to you, what a misery it would be."

"There is no help for it, William. Water must, if possible, be procured, and now is a better time to make the attempt than later, when they may be more on the watch; they have left off their work, and are busy eating; if I meet anyone, it will only be a woman."

Ready went for the barrico, a little cask, which held six or seven gallons of water. He put on the head-dress and war-cloak of the savage; and, taking the barrico on his shoulder, and the spear in his hand, the poles which barred the door were softly removed by William, and after ascertaining that no one was concealed beneath the palisades, Ready pressed William's hand, and set off across the cleared space outside of the stockade, and gained the cocoa-nut trees. William, as directed, closed the door, passed one pole through the inner door-posts for security, and remained on the watch. He was in an awful state of suspense, listening to the slightest noise; even the slight rustling by the wind of the cocoa-nut boughs above him made him start; there he continued for some minutes, his gun ready cocked by his side.

It is time that he returned, thought William; the distance is not one hundred yards, and yet I have heard no noise. At last he thought he heard footsteps coming very softly. Yes, it was so. Ready was returning, and without any accident. William had his hand upon the pole, to slip it on one side, and open the door, when he heard a scuffle and a fall close to the door. He immediately threw down the pole, and opened it just as Ready called him by name. William seized his musket, and sprang out; he found Ready struggling with a savage, who was uppermost, and with his spear at Ready's breast. In a second William levelled and fired, and the savage fell dead by the side of Ready.

"Take the water in quick, William," said Ready in a faint voice. "I will contrive to crawl in if I can."

William caught up the barrico of water, and took it in; he then hastened to Ready, who was on his knees. Mr. Seagrave, hearing the musket fired, had run out, and finding the stockade door open, followed William, and seeing him

endeavouring to support Ready, caught hold of his other arm, and they led him tottering into the stockade; the door was then immediately secured, and they went to his assistance.

"Are you hurt, Ready?" said William.

"Yes, dear boy, yes; hurt to death, I fear: his spear went through my breast. Water, quick, water!"

"Alas! that we had some," said Mr. Seagrave.

"We have, papa," replied William; "but it has cost us dearly."

William ran for a pannikin, and taking out the bung, poured some water out of the barrico, and gave it to Ready, who drank it with eagerness.

"Now, William, lay me down on these cocoa-nut boughs; go and give some water to the others, and when you have all drank, then come to me again. Don't tell Mrs. Seagrave that I'm hurt. Do as I beg of you."

"Papa, take the water—do, pray," replied William; "I cannot leave Ready."

"I will, my boy," replied Mr. Seagrave; "but first drink yourself."

William, who was very faint, drank off the pannikin of water, which immediately revived him, and then, while Mr. Seagrave hastened with some water to the children and women, occupied himself with old Ready, who breathed heavily.

After returning twice for water, to satisfy those in the house, Mr. Seagrave came to the assistance of William, who had been removing Ready's clothes to ascertain the nature and extent of the wound which he had received.

"We had better move him to where the other cocoa-nut boughs lie; he will be more comfortable there," said William.

Ready whispered, "More water." William gave him some more, and then, with the assistance of his father, Ready was removed to a more comfortable place. As soon as they had laid him there, Ready turned on his side, and threw up a quantity of blood.

"I am better now," said he in a low voice; "bind up the wound, William; an old man like me has not much blood to spare."

Mr. Seagrave and William then opened his shirt, and examined the wound; the spear had gone deep into the lungs. William threw off his own shirt, tore it up into strips, and then bound up the wound so as to stop the effusion of blood.

Ready, who at first appeared much exhausted with being moved about, gradually recovered so as to be able to speak in a low voice, when Mrs. Seagrave came out of the house.

"Where is that brave, kind man?" cried she, "that I may bless him and thank him."

Mr. Seagrave went to her, and caught her by the arm.

"He is hurt, my dear; I am afraid very much hurt. I did not tell you at the time."

Mr. Seagrave first briefly related what had occurred, and then led her to where old Ready was lying. Mrs. Seagrave knelt by his side, took his hand, and burst into tears.

"Don't weep for me, dear madam," said Ready; "my days have been numbered; I'm only sorry that I cannot any more be useful to you."

"Dear, good old man," said Mrs. Seagrave, after a pause, "whatever may be our fates, and that is for the Almighty to decide for us, as long as I have life, what you have done for me and mine shall never be forgotten."

Mrs. Seagrave then bent over him, and, kissing his forehead, rose from her knees, and retired weeping into the house.

"William," said Ready, "I can't talk now; raise my head a little, and then leave me; I shall be better if I'm quiet. You have not looked round lately. Come again in about half an hour. Leave me now, Mr. Seagrave; I shall be better if I doze a little."

William and Mr. Seagrave complied with Ready's request; they went up to the planks, and examined all round the stockade, cautiously and carefully; at last they stopped.

"This is a sad business, William," said Mr. Seagrave.

William shook his head. "He would not let me go," replied he; "I wish he had. I fear that he is much hurt; do you think so, papa?"

"I should say that he cannot recover, William. We shall miss him to-morrow if they attack us."

"I hardly know what to say, papa; but this I feel, that since we have been relieved, I am able to do twice as much as I could have done before."

"I feel the same, my dear boy, but still with such a force against us, two people cannot do much."

"If my mother and Juno load the muskets for us," replied William, "we shall at all events do as much now as we should have been able to do if there were three, so exhausted as we should have been."

"Perhaps so, my dear William; at all events we will do our best, for we fight for our lives and the lives of those most dear to us."

William went softly up to Ready, and found that the old man was dozing, if not asleep; he did not therefore disturb him, but returned to his father; they carried the barrico of water into the house, and put it in Mrs. Seagrave's charge, that it might not be wasted; and now that their thirst had been appeased, they all felt the calls of hunger. Juno and William went and cut off steaks from the turtle, and fried them; they all made a hearty meal, and perhaps never had they taken one with so much relish in their lives.

It was nearly daylight, when William, who had several times been softly up to Ready to ascertain whether he slept or not, found him with his eyes open.

"How do you find yourself, Ready?" said William.

"I am quiet and easy, William, and without much pain; but I think I am sinking, and shall not last long. Recollect that if you are obliged to escape from the stockade, William, you take no heed of me, but leave me where I am. I cannot live, and were you to move me, I should only die the sooner."

"I had rather die with you, than leave you, Ready."

"No, sir, that is wrong and foolish; you must save your mother, and your brothers and sister; promise me that you will do as I wish."

William hesitated.

"I point out to you your duty, Master William. I know what your feelings are, but you must not give way to them; promise me this, or you will make me very miserable."

William squeezed Ready's hand; his heart was too full to speak.

"They will come at daylight, William —I think so at least; you have not much time to spare; climb to the look-out, and wait there till day dawns; watch them as long as you can in safety, and then come down, to tell me what you have seen."

Ready's voice became faint after this exertion of speaking so much.

He motioned to William, who immediately climbed up the cocoa-nut tree, and waited there till daylight.

At the dawn of day, he perceived that the savages were at work, that they had collected all the faggots together opposite to where the old house had stood, and were very busy in making arrangements for the attack. At last, he perceived that they every one shouldered a faggot, and commenced their advance towards the stockade; William immediately descended from the tree, and called his father, who was talking with Mrs. Seagrave. The muskets were all loaded, and Mrs. Seagrave and Juno took their posts below the planking, to reload them as fast as they were fired.

"We must fire upon them as soon as we are sure of not missing them, William," said Mr. Seagrave, "for the more we check their advance, the better."

When the first savages were within fifty yards, they both fired, and two of the men dropped; and they continued to fire as their assailants came up, with great success for the first ten minutes; after which the savages advanced in a larger body, and took the precaution to hold the faggots in front of them, for some protection as they approached. By these means they gained the stockade in safety, and commenced laying their faggots. Mr. Seagrave and William still kept up an incessant fire upon them, but not with so much success as before.

Although many fell, the faggots were gradually heaped up, till they almost reached to the holes between the palisades, through which they pointed their muskets; and as the savages contrived to slope them down from the stockade to the ground, it was evident that they meant to mount up, and take them by escalade. At last, it appeared as if all the faggots had been placed, and the savages retired further back, to where the cocoa-nut trees were still standing.

"They have gone away, father," said William; "but they will come again, and I fear it is all over with us."

"I fear so too, my noble boy," replied Mr. Seagrave; "they are only retreating, to arrange for a general assault, and they now will be able to gain an entrance. I almost wish that they had fired the faggots; we might have escaped as Ready

pointed out to us, but now I fear we have no chance."

"Don't say a word to my mother," said William; "let us defend ourselves to the last, and if we are overpowered it is the will of God."

"I should like to take a farewell embrace of your dear mother," said Mr. Seagrave; "but, no; it will be weakness just now. I had better not. Here they come, William, in a swarm. Well, God bless you, my boy; we shall all, I trust, meet in heaven."

The whole body of savages were now advancing from the cocoa-nut wood in a solid mass; they raised a yell, which struck terror into the hearts of Mrs. Seagrave and Juno, yet they flinched not. The savages were again within fifty yards of them, when the fire was opened upon them; the fire was answered by loud yells, and the savages had already reached to the bottom of the sloping pile of faggots, when the yells and the reports of the muskets were drowned by a much louder report, followed by the crackling and breaking of the cocoa-nut trees, which made both parties start with surprise; another and another followed, the ground was ploughed up, and the savages fell in numbers.

"It must be the cannon of a ship, father," said William; "we are saved—we are saved!"

"It can be nothing else; we are saved, and by a miracle," replied Mr. Seagrave in utter astonishment.

The savages paused in the advance, quite stupefied; again, again, again, the report of the loud guns boomed through the air, and the round shot and grape came whizzing and tearing through the cocoa-nut grove; at this last broadside, the savages turned, and fled towards their canoes: not one was left to be seen.

"We are saved!" cried Mr. Seagrave, leaping off the plank and embracing his wife, who sank down on her knees, and held up her clasped hands in thankfulness to Heaven.

William had hastened up to the look-out on the cocoa-nut tree, and now cried out to them below, as the guns were again discharged—

"A large schooner, father; she is firing at the savages, who are at the canoes; they are falling in every direction: some have plunged into the water; there is a boat full of armed men coming on shore; they are close to the beach, by the garden point. Three of the canoes have got off full of men; there go the guns again; two of the canoes are sunk, father; the boat has landed, and the people are coming up this way." William then descended from the look-out as fast as he could.

As soon as he was down, he commenced unbarring the door of the stockade. He pulled out the last pole just as he heard the feet of their deliverers outside. He threw open the door, and, a second after, found himself in the arms of Captain Osborn.

. . . . . .

We close the quotation with the rescue of the party. The rest of the story can be summed up in a few words.

It now appeared that the brig that had been sighted some months before had seen the signal made to her; but the weather was so rough that the captain had made all speed to Sydney and there reported what had taken place.

The boat in which the seamen of the Pacific had left that vessel, taking with them their unconscious captain, had been picked up and taken to Van Diemen's Land. Here Captain Osborn settled. When he heard the report brought by the brig, he induced the Government to lend him a vessel in which to seek his former shipmates.

The vessel arrived off the island on the same morning that the fleet of canoes made a landing. When William told Ready of the ship off the garden point, the sailor would have discovered the English schooner if he had had his telescope.

Ready lived long enough to see Captain Osborn again, and to thank God for the preservation of those for whom he had worked so well. The closing scene is thus described:

"Ready opened his eyes. 'Are you there, William? I can't see you. Listen to me, my dear boy! Let me be buried under the trees on the mound above the well. I wish to lie there. Poor little Tommy! Don't let him know that he was the cause of my death. Bring him here now, and Juno and Caroline, to say good-bye, William.' "

The old man's last wishes were reverently attended to. The Seagraves prospered, and Tommy "grew up a very fine fellow and entered the army."

THE END OF FAMOUS BOOKS.

Three styles of the useful Windsor chair.

THE ART OF FURNITURE-MAKING

CONTINUED FROM 6690

CHAIRS and tables, tables and chairs—although we all have them and use them, we seldom think about them so long as they fit into our needs and make for our comfort. But you may meet a person some day who will glance at a chair-back or a table-leg and murmur a name—"Chippendale," "Hepplewhite," "Sheraton" or "Duncan Phyfe." You may hear of a "Queen Anne house," an "Adam room," or an "Empire room." And what does it all mean? Simply that there have been various styles in furniture and decoration and that each style is known by some particular name—the name of a ruler or a government, or of a man who has had force and originality enough to introduce a style of his own designing.

If you think back to very early times you will realize that furniture was not always a convenience. Suppose that you belonged to an ancient pastoral tribe, living in tents and moving often to fresh fields on which to pasture the flocks. Tents and cooking utensils would be about as much paraphernalia as could be carried about without too much trouble. But simplicity and sparseness in furnishing do not of necessity go hand in hand with lack of beauty. The shepherd folk of the East wove richly colored rugs to carpet their tents, and handsome hangings to please the eye with loveliness of hue and design. The camel-cloths and other trappings of their beasts of travel were made attractive with decoration.

Modern European (and American) civilization has made us feel the need of many sorts of furniture. If you lived in a cave you would sit down on a stone or a log; but in a house you look for a chair or a couch. If you have a book to dispose of, you turn to a table or a bookshelf. If you have a garment to lay aside, you expect to find a place for it in cupboard or drawer. When you are tired, there must be a bed to rest upon. When meal-time comes, you take your place at a dining-table set with dishes and silver.

Because, then, furniture is first of all intended for use and convenience in daily life, it ought always to be useful and convenient; but it may, besides, count as a part of our education. If we live in the midst of ugly surroundings and grow used to the sight of unlovely, inartistic objects, these may influence our taste so that we shall not be quick to recognize and appreciate really beautiful things. Now and then someone is born who feels this so

deeply and who loves beauty so intensely that he spends his life trying to reform general taste and working to make homes beautiful. We shall tell you about some of these men.

First we shall think of England just about two hundred years ago. By that time its furniture had already passed through many changes. That of the Saxons had been rather barbarous and rough; that brought in by the Normans was elaborate and heavy; later periods had felt the influence of changing styles on the continent of Europe, particularly in France and the Low Countries. This came about quite naturally. For instance, when the Italian Renaissance ushered in more beautiful and practical furniture—furniture that could be moved about—the fashion crept across Europe through France and by way of Spain into Spain's dominions of the Low Countries, directly across the Channel from England. Presently English furnishings were taking on a Renaissance air. By the time of Queen Elizabeth tables were changing from the simple "board" laid upon trestles to a substantial long slab of solid wood supported on sturdy legs at the corners, with a foot-rail connecting the legs at the base. Chairs were still heavy and not very common, the less important folk having to sit upon forms and settles or stools.

Furniture less heavy and in greater variety than before

When the Stuarts were ruling, especially when they came back from France after the Commonwealth, or Cromwellian period, French and Flemish elements became very noticeable in English styles. There was greater variety in furniture, and it was made less heavy and cumbersome. Marquetry, or inlay of ebony, ivory, mother-of-pearl and other materials, was admired in decoration. Tapestries and embroideries were much used for covers on upholstered chairs. Some of the smaller tables had "gate-legs" to hold up side leaves, and among the chairs there were some handsome designs with backs of carved oak framework surrounding narrow panels of cane. These appeared in what is known as the Restoration era.

Then came the Dutch ruler, William of Orange, during whose reign it was natural that Dutch and Flemish ideas should take the lead. But at the same time, among the Huguenots fleeing from France to England came Frenchmen who were designers and workers in wood. Moreover, from far-away China traders were bringing lacquered cabinets and other Chinese objects, which became very much the fashion. So styles followed one after another and clashed or mingled, until in Queen Anne's reign a more truly English mode seemed to be forming amid all this strange jumble of foreign contributions. One kind of chair very much liked in her day had a simply shaped carved splat up the middle of the back, and from this was called a "fiddle-back" chair.

Sorts of wood used in the eighteenth century

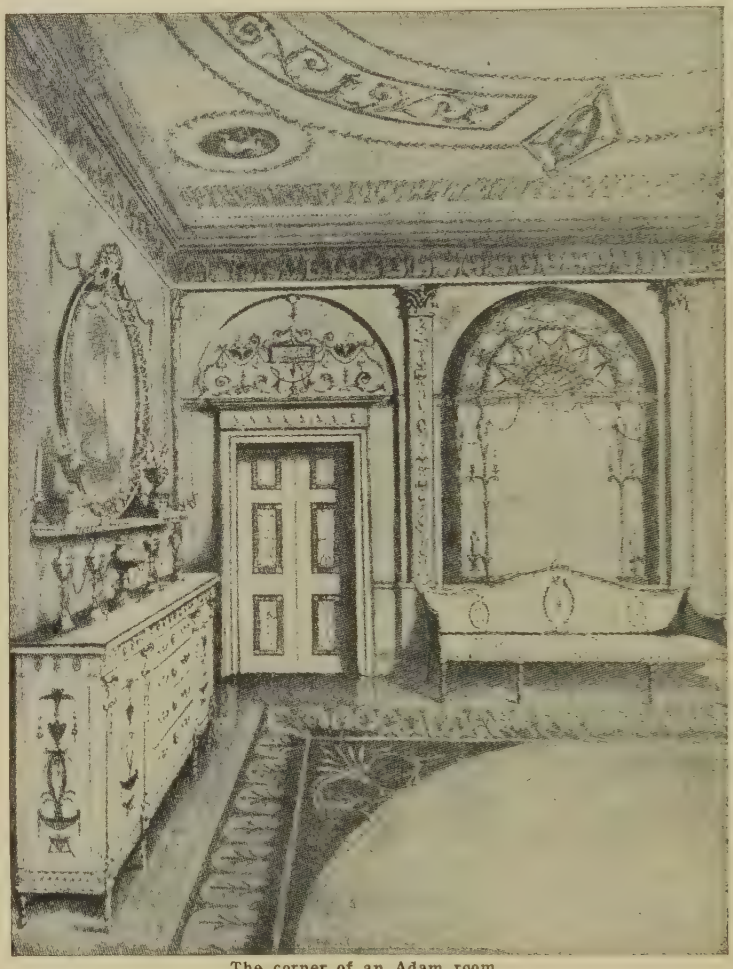
Until the middle of the sixteen hundreds, that is, until after the days of Cromwell in England, furniture was seldom made of any wood but oak—strong, dark, substantial, lasting for generations. Then as more intricate carving was introduced, walnut took the first place, keeping in the lead until about 1725, the period we have reached in our story. Mahogany was the favorite wood for handsome furniture during the whole century that followed, although satinwood, pear, tulipwood, ebony and others were used often for inlay work, and satinwood sometimes was chosen for the whole frame. Painted and lacquered, or japanned, surfaces, too, were popular at times.

Before the end of Queen Anne's reign there was born in England one who before his death, in 1779, was to lay a strong guiding hand upon the furniture designs of his native land. By 1727, when George I was king, a young man, Thomas Chippendale, with his father — also Thomas — who was a cabinet-maker, had moved to London. There the business started by the father was carried on by the son with such success that "Chippendale" furniture, whether made by him or by others following his designs, has become familiar all around the globe. And why? Because, instead of just frowning over qualities he disliked in the furniture then in use, he dared to start making furniture according to his own taste and ideals. Without losing sight of the fact that an article must be built for strength and service, he aimed to combine those qualities with greater grace and lightness than had been known before; and the result in his best work was solidity without heaviness. With the skill of a true artist

JOSHUA REYNOLDS CALLS ON CHIPPENDALE

Many famous persons met in Chippendale's workshop in St. Martin's Lane, London. Here the great painter Sir Joshua Reynolds is seen talking to the master of furniture craft.

he could gather together a variety of ideas and weave them into a harmonious original plan which showed the impress of his own personality. At different times he made use of Gothic, French, Dutch, classic and even Chinese elements, and usually the pieces he produced had beauty and distinction. In his later years, however, he was tempted to mix styles too unrelated to each other, with results that were grotesque. At carving he was always a master.



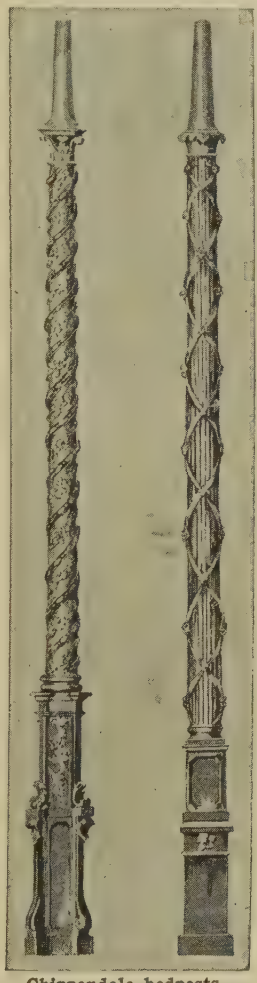
The corner of an Adam room.

So, if you had been in London in 1750 and later, you would very likely have seen in some of the finest houses Thomas Chippendale's cabinets, bookcases, writing-desks, tables and clock-cases, and, of course, his chairs. For in chair-backs he made great changes and introduced a wide variety of decorative themes. Where they had been solid, or nearly solid, before, he made exquisite open-work carvings, giving the effect of tracery or interwoven strands—"the most elegant and pleasing thing" that had yet been done in furniture. A favorite design for his chair-backs was a looped-ribbon pattern. The legs of the chairs, too, were varied and made less thick and clumsy than before.

Not content with reaching only those homes which could be supplied from his own shop, Chippendale wrote a book, The Gentleman and Cabinet Maker's Director, which was widely studied and helped to increase his influence. It seems astonishing that one man, starting all obscure and unknown, should have been able to work so wide a change during a single lifetime. In addition to his artist impulse he must have had enormous courage and force. Suppose that some quiet, inconspicuous tailor to-day should try to give us entirely new fashions in clothes. Who would pay attention to him unless his designs were astonishingly pleasing?

The next stirring influence in house decoration came in the person of Robert Adam, born in Scotland about the time when the Chippendales were starting business in London. Educated at Edinburgh and in Italy, Robert became an architect, and in his profession shone only a little more brilliantly than his three brothers. All four probably learned from their father their first lessons in architecture, for he had already achieved success in this calling. About 1768 the Adam brothers planned and erected a

splendid block of buildings in London between the Strand and the Thames, naming it the Adelphi, from a Greek word which means the "brothers." They built, besides, some of the handsomest houses in London and in other parts of the country. We have reason to feel especially grateful to them, for they were among the first architects to make fine large windows to let in plenty of light and air.



Chippendale bedposts.

Robert, during his three years of study in Italy, had become so enthusiastic over Roman and old Italian architecture and decoration that afterward a strong classic influence always touched his own work. But instead of copying the old designs he used them as models in creating a new manner of decoration, distinctively his own, with ovals and other curved lines as foundation forms. For you must know that this architect thought of a house as a whole, and wished to plan its interior adornment and its surroundings—not simply the shell of a dwelling-place. Even a dog-house was not too small a detail to be passed over. He and his brother James gave much attention to furnishings for the rooms they designed. Not only were doorways and mantelpieces a harmonious part of the wall-picture; but sideboards, mirrors, sofas and chairs were especially made to fit the scheme.

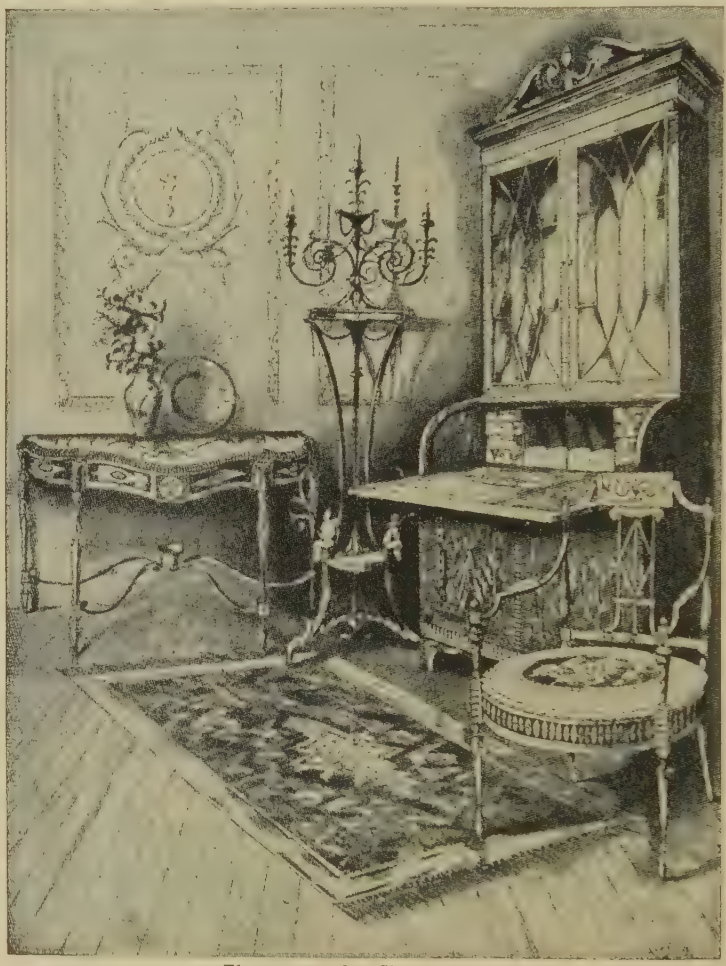
"Adam" furniture had less carving than had been used before. Instead, inlays of handsome woods were employed, or furniture was painted with attractive designs. On the whole the outlines were simple and the effect was delicate. For one thing, the elaborate curved legs that had been used for chairs and tables were given up for slender straight legs. Another change in construction made about this time—one which produced an effect of greater lightness—was the omission of stretchers, or underbracings, joining the legs of a chair near the foot.

A Sheraton clock.

The good work started by Chippendale and the Adam brothers spread fast, and a number of artists in furniture appeared. Among these, George Hepplewhite left a name which represents a style marked by light and delicate grace. Some of his products have even a fragile look, but they are really of sound construction. Legs, straight and tapering, were given a more slender appearance by the use of vertical lines of grooving. Chairs could be made smaller now than in earlier days, for hoop skirts had gone out of style; and upon planning beautiful chairs Hepplewhite spent much thought. Perhaps no other chair-back pleased him more than that with an open-work shield shape. He used it many times with pleasant variations. To this designer we owe much in the development of the sideboard—an article of furniture, which, like its cousin, the chest of drawers, was a descendant of the ancient carved chest. The chest, by the way, was the earliest form of furniture.

Now we come to "the most remarkable man in the history of English furniture."

Thomas Sheraton, born about 1751, was so many-sided in his ability that a sort of confusion of gifts was his undoing. First a writer on religious subjects and occasionally a preacher, he was artist, inventor and mechanic as well. Sometimes he gave drawing lessons to help make a living. Someone who visited him wrote that his house was "half shop, half dwelling-house, and himself looked like a worn-out Methodist minister, with threadbare black coat." His disposition was sharp, and he was likely to emphasize his own ability while speaking ungenerously of his rivals and his predecessors. Chippendale's designs he called "wholly antiquated and laid aside!" We, of course, do not agree with that opinion.



The corner of a Sheraton room.

This "great artistic genius living in chronic poverty" designed and made some of the most beautiful furniture ever produced outside of France—severely simple in line, exquisite in proportion and balance, delicate and lovely in decoration. Besides mahogany he used satinwood and other woods that had interesting grain and took a high polish. Carving in low relief was employed sparingly, but inlaid ornamentation was frequently a part of his plan and showed his rare skill and taste. Sideboards, bookcases, desks, sofas and chairs made after his models in his best style are most elegant and graceful. Yet the clever mind of Sheraton was sometimes betrayed into stupid yielding to fashion, especially in later years, when the French Empire styles were being wildly followed. Then, as heavier masses and crowded ornament came in, his designs presented a kind of zoo of sphinxes, lions and fabulous beasts in carving and metal mountings.

Sheraton could design and teach others better than he could actually make furniture himself; so he gave up furniture-making and wrote valuable books of practical instruction for furniture-makers. It is sad to think that at the time of his death, in 1806, he was in poverty, while to-day a good suite of his furniture sells for money enough to have kept him in plenty all his life.

And now let us move back a little in time and across the ocean. When the first settlers arrived in North America they had to be content with the simplest benches, tables and cupboards, for space in the ships of those days was so limited

STYLES OF FOUR FAMOUS DESIGNERS

Armchair of Chippendale style, 1760–1770.

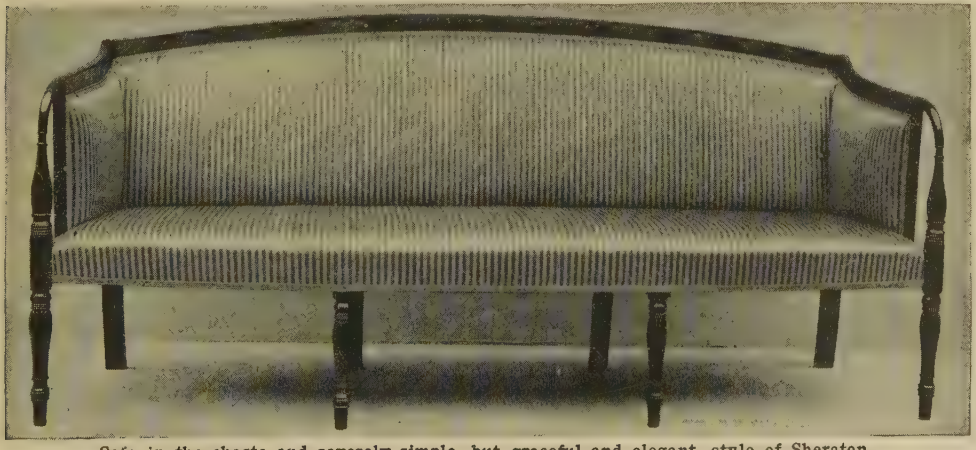
Tripod of the style of Chippendale.

Armchair of Chippendale style, 1760.

Armchair with characteristic shield-back design of Hepplewhite.

Table, one of a nest, style of the brothers Adam.

Upholstered armchair of the style of Sheraton.



Sofa in the chaste and severely simple, but graceful and elegant, style of Sheraton.

that not much furniture could be carried. Chests, used in place of trunks, were more numerous than other articles. So in the early log houses blocks took the place of stools, an ax-hewn plank laid on trestles did duty as a table, bedsteads were made of poles and the sides lashed together with ropes. But these crude beginnings were soon passed. The pioneers began to fashion rush-seated chairs, well-made tables, and carved chests of hand-hewn lumber. Many men who had had no training in cabinet-making became deft enough to construct furniture very creditable in shape and finish.

It was not long before pieces of the best furniture made in England were brought over for the houses of governors, wealthy merchants and other men of note. Colonial cabinet-makers and carpenters copied these new styles in wood from the beautiful trees felled in the forests around them, although these men had not the tools or the skill to give their products the exquisite finish that distinguished the articles brought from Europe. Their tables and chairs and cupboards were likely to be a little heavier in make and more clumsy in outline than those from which they took their designs. Their greatest success was reached in large pieces such as were difficult to import. Handsome highboys, in which the wardrobes of a whole family could be stored away, were almost peculiar to this continent. Many examples of the colonial craftsmen's handiwork are cherished now in private houses or in museums.

WINDSOR CHAIRS, STRONG AND USEFUL, NATURALIZED IN AMERICA

There was one quite simple style of chair introduced from England which, when changed a little, came to be a distinctively American piece of furniture. It had slender upright spindles in the back, which was rounded in a comfortable curve; the seat was nicely shaped of solid wood, and the legs slanted outward, but were made secure by three underbraces connecting them. These chairs, light in weight and in appearance, but strong for use, were called Windsors. They were made in a variety of styles, fitting many needs. When properly proportioned and finely finished, they had true beauty. In a Windsor chair, it is said, Jefferson wrote or signed the Declaration of Independence. Washington used a Windsor writing-chair, and on his veranda at Mount Vernon there were thirty other Windsors. Years afterward a Windsor writing-chair was dignified by serving the authors Emerson and Hawthorne.

Besides having examples of European furniture to copy, the American workers in wood possessed the books of English architects and designers, and had the advantage of studying their experience and ideas. A man might get his only training in woodcarving in the shipyards, and yet develop an art almost as true as that of Robert and James Adam. There were master workmen who "lived with their tools" and exalted their craft—like Samuel McIntire, of Salem, whose artistic feeling was broad and deep, and found expression in building beautifully proportioned houses with dignified doorways and stairways and graceful, chaste ornament in all the woodwork. Architects to-day go to Salem to study McIntire's designs.

CRAFTSMEN WHOSE WORK HAS BECOME OUR TREASURE

If the feeling for line, color and arrangement is born in a human being, he must become an artist of some sort; and in the young country there were clockmakers, glass-workers and silversmiths whose products show the loving thought, the devoted care, of the artist for his work. For instance, Paul Revere, Revolutionary hero, was also Paul Revere, silversmith.

But foremost on the list of master workmen from whose hands came furnishings that we cherish among our treasures stands the name of Duncan Phyfe. You remember that when the Erie Canal was finished, in 1825, it was opened with a big celebration. A cask of water from Lake Erie was carried to New York and was mingled with the waters of the Atlantic. When bottles of the canal-water were sent as a souvenir to General Lafayette in France, they were inclosed in a carved cedar casket cut from a log that had been brought down on the first canal boat to pass over the route; and the man chosen to make the chest was Duncan Phyfe, the most skilled wood-worker in all the land.

A young man of Scotch family, he had come to New York from Albany about 1790. At that time fortunes were growing and new houses were being built, with a consequent need of new furniture. Through the influence of a daughter of John Jacob Astor, who was an early patron, Phyfe's furniture soon became known

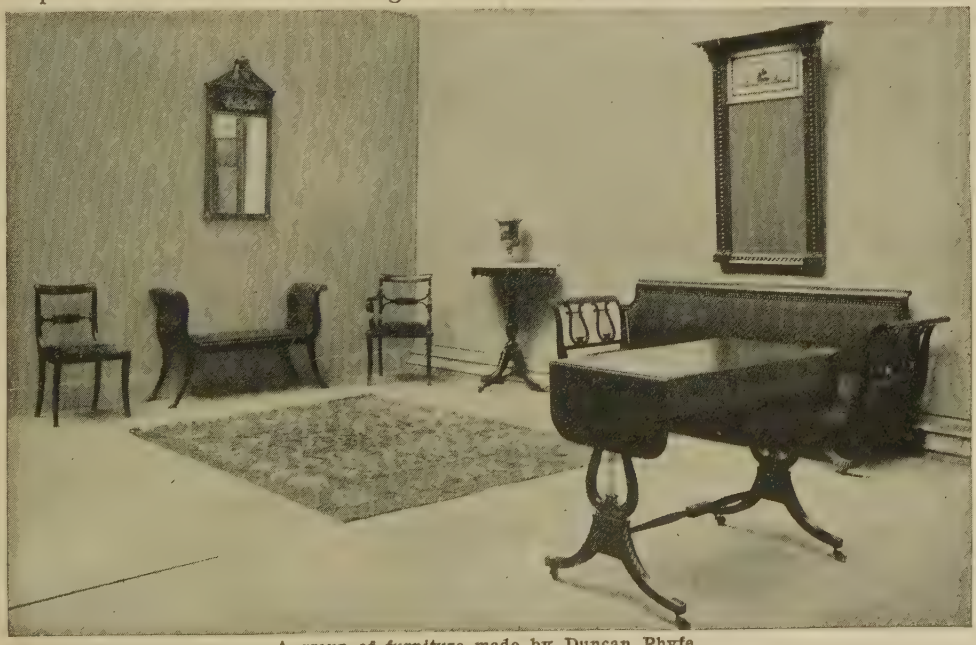
for its excellence; and orders from Philadelphia, Albany and other places were added to the New York demands, until a hundred journeymen cabinet-makers were at work under the master.

"An artist with his tools, not with his pencil," the little man, short pipe in mouth, fashioned models in his workshop, while far off in the southern forest logs of mahogany, chosen because of superior quality, were marked with his initials by West Indian exporters. These men spoke of "Duncan Phyfe logs" as New York society ladies spoke of "Duncan Phyfe furniture." Sometimes a log cost him as much as $1,000, and we cannot wonder that the precious material was stored in a private yard. No one could handle the fine wood so as to give it a more beautiful finish than Phyfe himself.

As to designs, he learned much from the study of Adam and Sheraton, but he had his own original style, one which showed a love of graceful curves, a sense of exquisite proportion, and delicate finish of detail. Sir Caspar Purdon Clark, the English authority, has declared that as workman and designer Duncan Phyfe "surpassed any of his British contemporaries." Unfortunately his best work was followed by some less beautiful in design, though not inferior in workmanship. For fashion was too strong to be defied even by this sturdy Scotsman, and he had finally to yield to a demand for copies of Empire models brought from Europe.

The men we have been studying laid good foundations upon which careful technical artists have been building ever since. But as population increased and huge supplies of furniture were needed, production by hand was too slow. In factories where machines did the work it was impossible to give it the same artistic, loving attention that enthusiastic craftsmen had lavished upon it. They, with only a few men in their employ, had been able to oversee every bit of work done. There was little hurry and rushing. But the factories with their humming machinery made a great change. From them vast storehouses were filled with furniture, which, lacking a master's thought and touch, was likely to be commonplace, if not ugly. Hundreds and thousands of pieces exactly alike were bound to appear. Our problem to-day is to find a way of bringing more beauty, taste and elegance into the settings of our daily life. And perhaps nothing else will give us more help in forming our own taste and setting our own standards than a knowledge of the furniture made by the artists of the eighteenth century.

THE NEXT STORY OF THE FINE ARTS IS ON PAGE 6897.



A group of furniture made by Duncan Phyfe.

Photos on this page and on pages 6767, 6773 and 6776, courtesy the Metropolitan Museum of Art.

An eighteenth-century room from Petersburg, Virginia, in the American Wing of the Metropolitan Museum of Art. The architectural style, as seen in paneled walls, doorways, window recesses, fireplace, mantel and other features, is of the type of the Adam brothers, while the furniture follows the Sheraton designs.

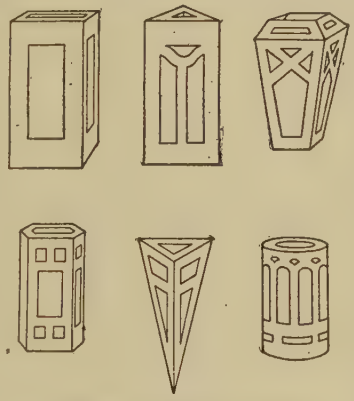
An eighteenth-century room from the Powel House, Philadelphia, in the American Wing of the Metropolitan Museum. The furniture, made in Philadelphia, is designed after beautiful and elaborate Chippendale models; the decoration of the wall and ceiling bears traces of French influence as well.

PAPER LANTERNS AND SHADES

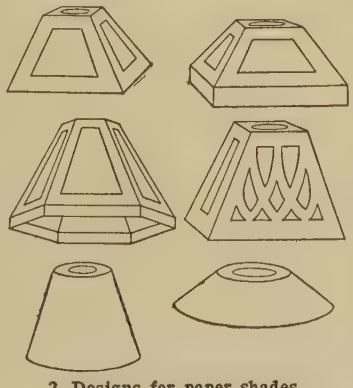
CONTINUED FROM 6646

THE attractive and useful lanterns and shades shown in picture 1 and picture 2 are easily made by children of all ages. There is abundant opportunity for each child to express himself in color both through constructive and through decorative design. These paper lanterns may be constructed of cover paper, bristol board, folder or tagboard. The material should be of sufficient thickness to give strength and stability to the structure. Paper lanterns may also be constructed out of pasteboard boxes, such as cracker and hat boxes. These may be made square, oblong, hexagonal or round, and of varying sizes to suit the purpose and the taste.

First draw the outline of the figures on the sides of the body of the lantern. Then cut these out with knife or scissors and remove the parts of the paper so that the opening becomes the outline of the patterns or figures, such as landscapes, ships, houses, birds, faces, and so on. Now pierce the paper in places for windows in houses or eyes in birds or animals, as the case may be. Next cover the openings with white, red, green or blue tissue-paper, pasting this to the inside of the lantern. Always be careful to place the paste on the inside of the lantern; none should be placed on the tissue, as the tissue will stretch and tear when it is moist. The cutting-out and pasting-on of the tissue-paper should be done before the lanterns are fastened together.



1. Designs for paper lanterns.



2. Designs for paper shades.

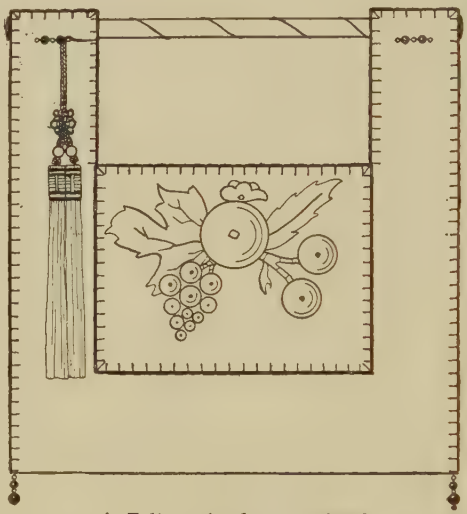
You will then be ready to cut out the entire panel-opening, leaving a margin of about 1 inch around the sides of the body of the lantern. Next paste tissue-paper on the inside of the opening. Then draw and cut out figures, using some opaque paper. Paste this paper to the inside of the tissue-paper. This method is especially satisfactory in making lanterns of pictorial and similar designs. In using a knife for cutting out the designs, something heavy, such as a piece of heavy strawboard, should be placed on the table to protect it.

Finally, on a piece of folder board or some other thick paper, draw and cut out one side of the lantern, including the decorative design. Then use this as pattern, or template, tracing around it, of course, making as many sides as may be desired. These templates are especially convenient in making paper shades. If you have followed directions, your lantern or shade should prove useful and beautiful.

HOW TO MAKE A FELT SEWING-BAG

EVERY girl wishes a sewing-bag of her own, or even if she has one she usually likes to make one for her mother. This bag is easily made, yet it is a most effective one.

First secure a piece of felt 27 inches long and 13 inches wide. Then fold it crosswise. At each open end measure 2½ inches from the outside edge and make a mark. From this mark on either side measure down 4½ inches and draw a line or place a pin—whichever is easier for you. Now cut out the material. The pattern drawing shown in picture 2, will help you in doing this.



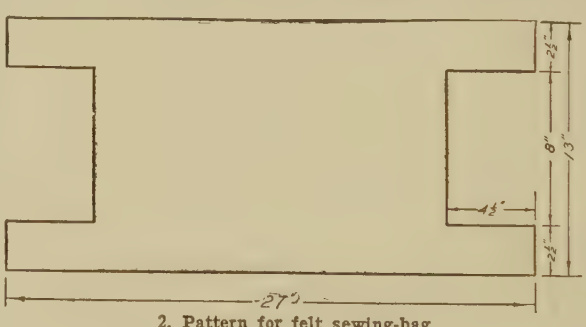
1. Felt sewing-bag completed.

Next sew up the two outside edges, also the two top edges. This sewing should be in from the edges from ⅜ inch to ½ inch. Now you are ready to make the pretty trimmings for the bag. If you have selected a gray felt for the bag, a dark blue piece of felt would be attractive for this decorative part. The ornaments you see in the drawing in picture 1 are nothing but button molds of different sizes. These are painted purple and arranged to represent a bunch of grapes. You may use water colors and paint them as you please. Sewing the grapes onto the bag will be found interesting. First make a knot in a double strand of heavy thread and bring it up through the hole of the button. Now secure a bead larger than the hole and slip the thread through this. Then take the needle down through the button mold and fasten it with a knot on the wrong side of this piece of material.

The large ornament in the centre is a big button painted yellow, with touches of green and a little red. The two at the extreme right may be painted red to represent apples. (The molds are all sewed on the same way—with a bead.) In making the leaves of the grapes, especially the large one at the extreme left, it would be wise to cut the pattern from a piece of paper. When you are satisfied with the shape, lay your pattern on a piece of dark green felt and cut it out.

To represent the veins of the leaves, take a piece of light green yarn and use the feather-stitch, which gives a pleasant irregular line. Carefully cut out the leaf at the upper right-hand corner in the same manner and put just one line of green yarn on this. To represent the stems, take a piece of black felt and cut as shown in picture 1. To fasten these leaves, first take a few stitches through from the wrong side of the leaves at the extreme points. You will observe from the picture that the leaves are of fairly good size. The one at the extreme right might well be made about 2¾ inches long. It will be found satisfactory first to sew the leaves and stems and then the molds. At the top of the big mold is a piece of white felt cut with five petals to represent a flower. This is folded over and held in place by a French knot.

The trimming and bag are finished off by using the blanket stitch on the edges, as shown in picture 1. The blue trimming is sewed on as you blanket-stitch round that side of the bag. To make the handle, secure a piece of doweling about 13½ inches long. Take a long piece of the dark blue felt, about 1 inch in width, and just wrap it round the doweling, as shown. At each end of the doweling put a covered button with a nail through it, and hammer it into the end of the doweling. Now slip the handle through the two ends of the bag and hold in place with five beads—three small white ones and two large black ones are suggested in picture 1. If desired, a few beads may be placed at the bottom to give it a finished appearance. Although the Chinese tassels included in the drawing of the bag in picture 1 make pretty ornaments, they are unnecessary, as the bag is attractive without them.



2. Pattern for felt sewing-bag.

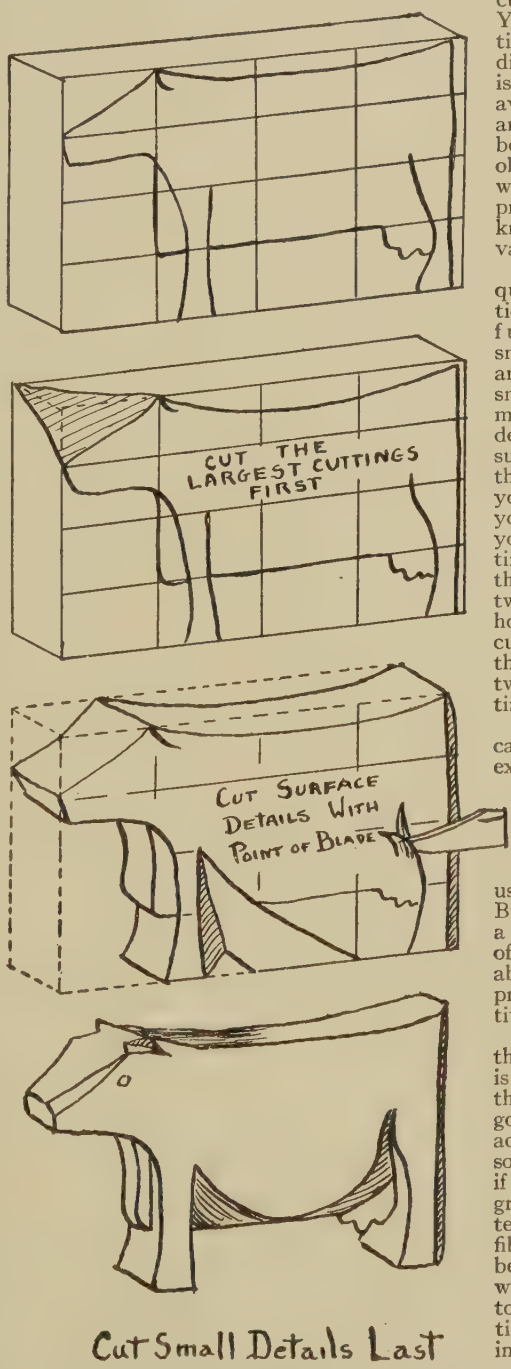
No doubt every girl who makes this bag will prefer to pick out the colors and designs she likes best. In any case she will have a very pretty bag with little effort. Although other materials may be used, the felt will prove satisfactory, because it does not ravel and it serves the purpose as well as the stronger materials.

HOW TO CARVE TOYS WITH A POCKET-KNIFE

NEARLY every boy owns a pocket-knife, but few boys seem to realize that interesting toys can be carved and shaped without the use of additional tools. Much pleasure and satisfaction come to boys who have discovered the numerous possibilities in carving with their pocket-knives. Some of the smaller children prefer to carve their toy animals from cakes of soap. However, these directions are intended for children who are large enough to carve their toys from wood.

A good sharp knife is needed for success in knife-carving. If you do not know how to sharpen your knife properly, you should ask an older and more experienced person to assist you. Many good knives have been made practically useless by owners who had not learned correct methods of sharpening them. In fact, the success of knife-carving depends so much upon the use of a sharp knife that it is suggested you begin to sharpen your knife under direction just as soon as you have decided to begin carving a wooden toy. After you have watched a skilled person grind, whet and strop your knife you will have a better understanding of how it should be done. Then a little practice from time to time will enable you to obtain results.

First secure a piece of wood large enough for a good holding space for one hand and enough wood extending to whittle on, with the knife in the other hand. Any of the soft, close-grained woods, such as sugar pine, yellow pine, poplar, basswood and gum, are good woods for carving. You should be able to find a fairly good wood for whittling in the boards taken from empty boxes obtained at one of the stores if you have none at home.



Now practice making cutting strokes by cutting away from you. You should also practice cutting in other directions. Although it is usually better to cut away from you, there are instances where better results can be obtained by cutting toward you. Therefore, practice holding the knife and cutting in various ways.

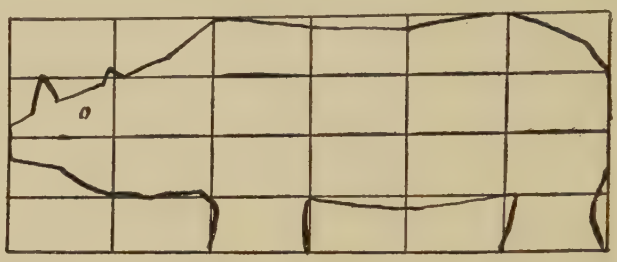
One can become quite skillful by practicing large cuts with full-arm strokes, smaller cuts with forearm movements, still smaller cuts with wrist movements, and small detail cuts by a pressure of the fingers and thumb. Avoid cutting yourself or those near you by being careful of your motions. In cutting toward you, have the cutting hand between you and the holding hand. When cutting from you, have the holding hand between you and the cutting hand.

A method of knife-carving which those of experience use considerably for short strokes consists of one in which the action is very similar to the one we use in clenching the fist. By using the thumb as a fulcrum the muscles of the hand are capable of a great deal of pressure with comparative ease.

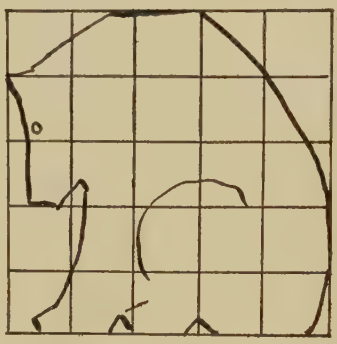
Observe which way the grain of the wood is running and cut in the direction that will go with the grain, or across the grain at some angle. Otherwise, if you cut against the grain, your knife will tend to go between the fibres, which may not be the direction you wish. It is very easy to determine the direction of the grain—it is indicated by the fine

lines on the sides of the pieces of wood.

After cutting in different directions with the knife held in various ways, begin to cut a block with a definite form in view. If possible secure a block with perfectly square corners and of approximately the following dimensions: 3½ inches long, 2 inches wide and ½ inch thick. With a pencil mark off lines, dividing the face of this block into halves and quarters lengthwise and sidewise, thus dividing it into sixteen rectangles. With the rectangles as guides, draw the outlines of an animal as shown in the uppermost picture on page 6779.



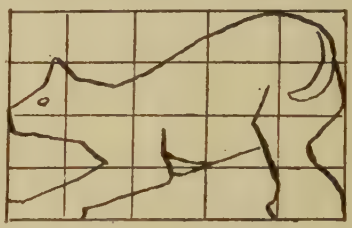
By holding the block as shown, cut off a piece of the corner just above, and up to, the head. Do not attempt cutting off large pieces with one cutting, but cut off that which will cut easily and continue cutting until the necessary amount has been cut off.



It is better to cut to the desired form gradually than to cut off too much at once and then not be able to replace it easily.

You will find when following the steps as shown in the pictures on page 6779 that it will be necessary to cut by the different methods you have learned. Now turn the block around when you find it is possible to make a cut more effective.

After completing this little toy you will find that you can carve the next one much better, as you will, no doubt, profit by your first experience. You may continue this interesting carving until you have a whole group of animals that can be decorated in different colors, such as red, white, black, tan, spotted or striped.

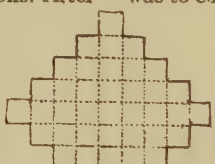


Based on the same principles, other animals, similar to those shown in the pictures on this page, may be carved out of wood, using, of course, blocks of different proportions, according to the sizes and shapes of the animals chosen. The possibilities are unlimited for making useful toys in this manner, especially after you become skilled in this fascinating art of knife-carving. A group of these animal toys will make a much-appreciated Christmas or birthday gift for a younger brother, sister or friend. In fact, you can make a whole Noah's Ark assortment of creatures, always a favorite with children.

THE PUZZLE OF THE MYSTERIOUS SQUARE

ONE wet afternoon, instead of going out, Kenneth went into his father's library and began to look at some of the books. After a little while he came across a book of Eastern tales, and in it he found many interesting problems that the wizards of the East had invented to amuse their royal masters and their friends.

One of these problems he could not solve, however much he tried. He puzzled and puzzled over it for a long time, but all was useless. Picking up the book, he went and pushed open the study door and peeped into the room. Seeing that his father was not very busy, Kenneth went in and asked if he would show him how to do the puzzle. In the book that Kenneth gave to his father was a drawing exactly like that shown here, and the puzzle was to cut this figure into four pieces, by means of two straight cuts, so that the four pieces when put together in a certain way would form a perfect square.



The wizard's figure.

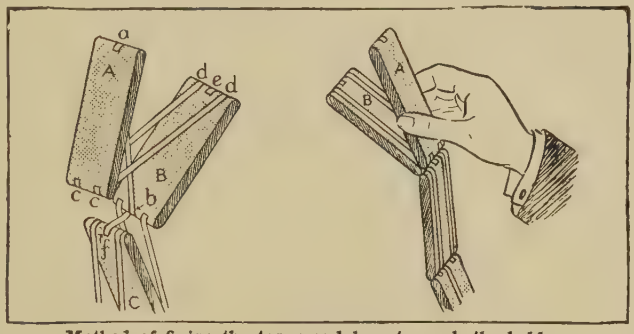
"Why, it is quite simple," said his father, with a laugh, after looking at it for a short time. "Take it away, Kenneth, and try again to do it yourself, and if you do it by to-morrow morning, I will give you a book as a reward." Kenneth tried very hard and at last he solved the puzzle quite correctly. How did the boy cut the figure and put the pieces together? The solution is on page 6959.

SOLUTIONS OF THE PUZZLE PICTURES ON PAGE 6646

ON page 6646 are ten sets of puzzle pictures, each set representing the name of a well-known plant. By putting together the names of the various objects that are shown in the pictures, we can discover what plants are represented by the artist. The correct answers to the puzzles are as follows: 1, Cabbage; 2, cauliflower; 3, larkspur; 4, apricot; 5, orchids; 6, hollyhocks; 7, box; 8, foxgloves; 9, heartsease; 10, gooseberries.

THE MYSTERIOUS JACOB'S LADDER

A VERY old puzzle, which is easily made, is that known as the Jacob's ladder. It consists of an ingenious arrangement of little pieces of wood and tape so fastened together that by holding the top piece of wood and alternately inverting it and bringing it back to its original position, another of the pieces of wood is apparently constantly falling from the top to the bottom of the ladder. To make one of these clever little toys we first of all get some suitable wood from which to cut the pieces we need, and for this purpose nothing better could be obtained than an ordinary cigar-box. We decide how many steps our Jacob's ladder shall have, and although it may consist of any number, great or small, an average number is ten. A greater number becomes rather unmanageable.



Method of fixing the tapes and how to work the ladder.

The pieces of wood must all be of exactly the same size—for example, 3½ inches by 2 inches; and when they are cut out with a fretsaw they should be nicely smoothed, and the top and bottom angles rounded slightly by rubbing with sandpaper.

Ordinary white or pink or black tape about ⅜ inch or ½ inch wide is used for joining the pieces of wood, and the method of fitting them to the wood is shown in picture 1. Each piece of wood has three tapes, and all the tapes should be of the same length—about 5 inches—so that the ends can just pass round with enough length to glue down on the wood as seen in the picture. There is a centre tape and side tapes for each piece of wood, and the arrangement is the same in each case, however many steps the Jacob's ladder may have. The centre tape *a* on the board *A* is fastened on the far side of the board *B* at *b*. The side tapes *cc* on *A* are fastened on the other side of *B* at *dd*, while the middle tape *e* on the board *B* passes on to the board C and is fastened at *f*, and so on throughout the entire length of the ladder. When all the tapes have been glued, we hold the top little board *A* as in picture 2, and *B* seems to fall to the bottom; then we invert *A*, and again the board next to it seems to fall to the bottom. *A* is returned to its original position, and the board drops again, and so on without end. The whole thing is a clever optical illusion. This toy is said to have been invented in Japan many hundreds, if not thousands, of years ago, and large numbers of Jacob's ladders are sent from Japan every year for sale in the cities and towns of Europe and America.

A FILTER THAT A BOY CAN MAKE

IT is always well to filter our drinking-water, especially if we live in the country, and there is a very simple form of filter that any boy or girl can make with little trouble. We take an ordinary garden flower-pot 8 or 9 inches in diameter at the top, and after thoroughly washing it we stop the hole with a piece of sponge, which must not fit too tightly. Then we put in a layer of charcoal, about 2 inches deep, and above this a layer of clean sand, with a layer of clean, coarse gravel 3 inches thick on top. The filter is now quite ready for use. We fix it up over a vessel of some kind, and let the water which we want filtered run through the various layers in the flower-pot. Of course, from time to time the filter wants cleaning out thoroughly, but this is done quite easily, and we shall find that, simple as is this little apparatus, we have a thoroughly effective and serviceable filter.

ANSWERS TO PUZZLES ON PAGES 6640 AND 6641

1. Aspirate, pirate, irate, rate, ate, at, tear, tea, ear, era, rat, tar.

2. G olf
   L ily
   A pe
   D agger
   S ack
   T oulon
   O nyx
   N ora
   E lm

3. I ate next to nothing!
4. 6 triangles.
5. Tennyson.
6. Rainbow.
7. A dventure R
   L e A
   E ntra P
   X anthipp E
   A riost O
   N u F
   D o T
   E ac H
   R emors E
   P ul L
   O ntari O
   P aralyti C
   E l K
8. Pen-man-ship.
9. Crow and parrot become prow and carrot.
10. (1) Pink; (2) Erica; (3) Iris; (4) Anemone; (5) Daisy; (6) Pansy; (7) Lobelia; (8) Harebell; (9) Rose; (10) Gentian.
11. Because the year 1888 began on a Sunday and ended on Monday, and 1889 began and ended on Tuesday.
12. (1) Chase; hovel; avail; Seine; Ellen. (2) Tame; ager; mean; Erne.
13. The farmer added on each side of the field a triangular piece of land, its long side the same length as the side, its two short sides each one half the length of the field diagonal.
14. A piece of coal. When it sleeps on the wing. An L (ell). Short. Noise. Make the vest first. A law-suit.

THE BEAR AND THE LITTLE WOLF

A LITTLE PLAY FOR THE NURSERY

Persons in the Play: THE BEAR. THE LITTLE WOLF

ACT I

Scene: A road by a field. The Bear enters on one side, the Wolf on the other

THE BEAR: (appearing to be pleasantly surprised) Well met, brother. I was wishing to find
Someone to help with a plan in my mind.

LITTLE WOLF: (showing interest) Well met, brother; and what is your plan?
I'm sure I'll be glad to help if I can.

THE BEAR: (pointing toward field) Yonder field is plowed for planting with corn.
Would you help me to plant to-morrow morn?

LITTLE WOLF: Why, yes, I shall help if you will divide
All the crop that ripens as I decide.

THE BEAR: Well, how would you like to take one half?
That would be fair and neither could laugh.

LITTLE WOLF: Yes, that would be fair, and I agree
That the half of the crop shall be my fee.

THE BEAR: (with an air of knowledge) You know that 'tis said the roots of the plants
Go far down beneath the nest of the ants.

LITTLE WOLF: (innocently) Yes, so I have heard; 'tis wonderful indeed
So much should be roots and so little seed.

THE BEAR: Would you like for your share the half below ground,
Together with stalks that above it are found?

LITTLE WOLF: (offering his hand—or paw) Yes, content I shall be so to divide,
And thus we'll arrange I now do decide.

THE BEAR: (shaking hands with Little Wolf) We agree, then, that I shall have only the ears,
A plan, I must say, that leaves me with fears.

CURTAIN

ACT II

Scene: The same. The Bear beside a pile of ears of corn; Little Wolf beside a pile of cornstalks

LITTLE WOLF: (very meekly) I am sure, Brother Bear, you did not intend
To rob me, and thus to the poorhouse to send.

THE BEAR: (affecting surprise) Why do you thus my intentions deride?
You know you yourself were left to decide.

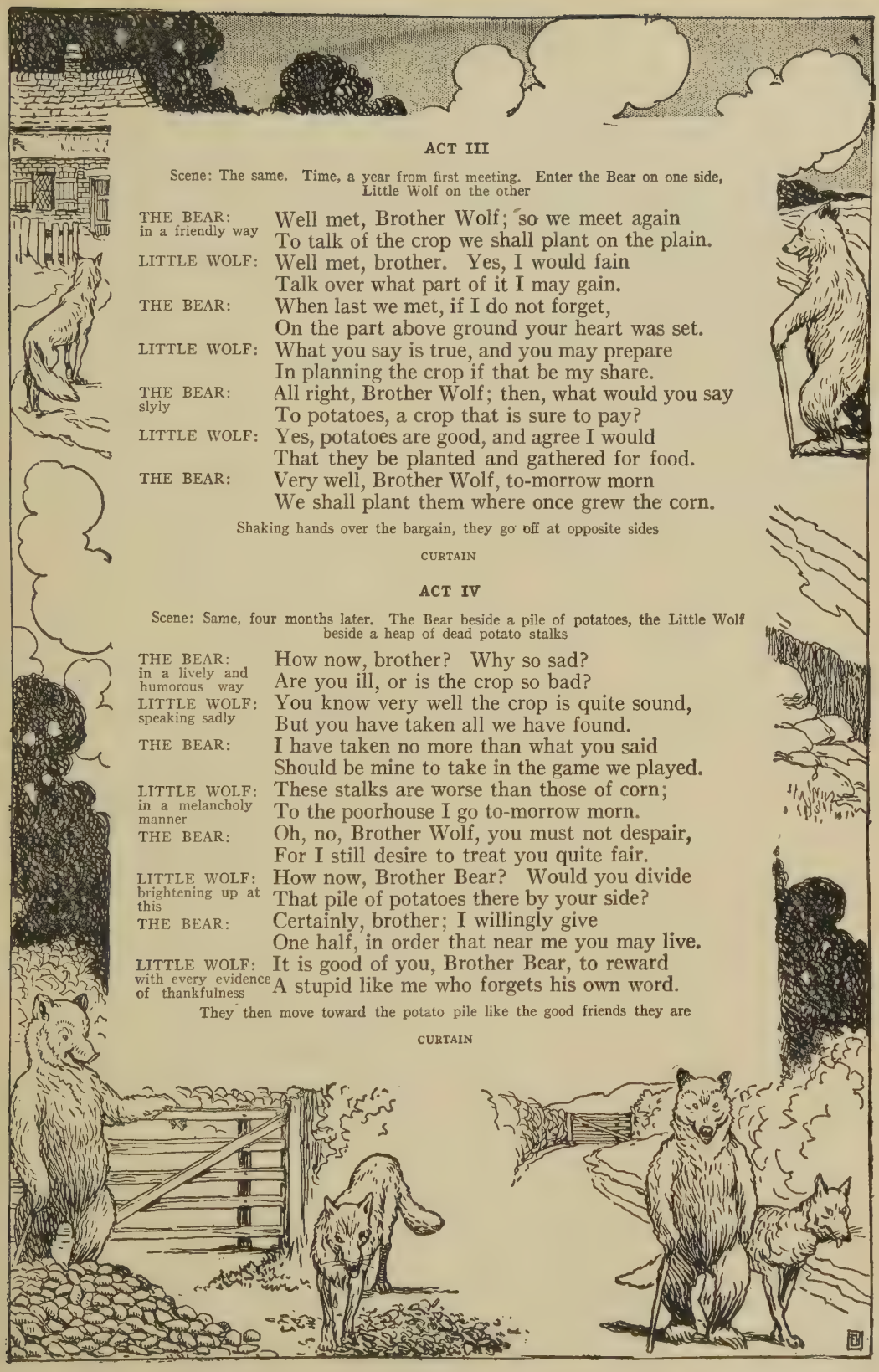
LITTLE WOLF: (indignantly) The roots are but trash, and the stalks as well
Are only for burning, and not to sell.

THE BEAR: Well, next year, my friend, the game we shall change,
And you shall have what you like to arrange.

LITTLE WOLF: Of this, then, be sure, I never shall choose
The worthless old roots that I cannot use.

Both walk off in opposite directions

CURTAIN



ACT III

Scene: The same. Time, a year from first meeting. Enter the Bear on one side, Little Wolf on the other

THE BEAR: in a friendly way — Well met, Brother Wolf; so we meet again
To talk of the crop we shall plant on the plain.

LITTLE WOLF: — Well met, brother. Yes, I would fain
Talk over what part of it I may gain.

THE BEAR: — When last we met, if I do not forget,
On the part above ground your heart was set.

LITTLE WOLF: — What you say is true, and you may prepare
In planning the crop if that be my share.

THE BEAR: slyly — All right, Brother Wolf; then, what would you say
To potatoes, a crop that is sure to pay?

LITTLE WOLF: — Yes, potatoes are good, and agree I would
That they be planted and gathered for food.

THE BEAR: — Very well, Brother Wolf, to-morrow morn
We shall plant them where once grew the corn.

Shaking hands over the bargain, they go off at opposite sides

CURTAIN

ACT IV

Scene: Same, four months later. The Bear beside a pile of potatoes, the Little Wolf beside a heap of dead potato stalks

THE BEAR: in a lively and humorous way — How now, brother? Why so sad?
Are you ill, or is the crop so bad?

LITTLE WOLF: speaking sadly — You know very well the crop is quite sound,
But you have taken all we have found.

THE BEAR: — I have taken no more than what you said
Should be mine to take in the game we played.

LITTLE WOLF: in a melancholy manner — These stalks are worse than those of corn;
To the poorhouse I go to-morrow morn.

THE BEAR: — Oh, no, Brother Wolf, you must not despair,
For I still desire to treat you quite fair.

LITTLE WOLF: brightening up at this — How now, Brother Bear? Would you divide
That pile of potatoes there by your side?

THE BEAR: — Certainly, brother; I willingly give
One half, in order that near me you may live.

LITTLE WOLF: with every evidence of thankfulness — It is good of you, Brother Bear, to reward
A stupid like me who forgets his own word.

They then move toward the potato pile like the good friends they are

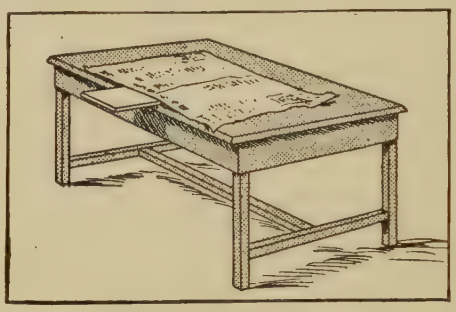
CURTAIN

HOW TO FEEL THE PRESSURE OF THE AIR

THERE is a very simple scientific experiment by which the pressure of the atmosphere may be felt, and which will, at the same time, cause a great deal of surprise and wonder to those who perform or see the experiment for the first time.

We take a board measuring about 2 feet in length by 4 or 5 inches in width, and, say, ¼ inch in thickness. This we place upon a table, with about 6 inches projecting beyond the table, and cover it with an opened newspaper, as shown in the picture on this page, taking care to smooth the paper down all over, so that it may lie as flat as possible on the table.

Now, clenching the hand, we bring it down with a sharp, hard blow upon the projecting wood. One who has never tried the experiment before naturally expects that the board will be knocked down off the table. But no matter how hard we may strike, the board will not go down.



The board that will not move.

The projecting end may be broken, but the board itself cannot be moved. And yet, if we *press* gently upon the end with one finger, the board can easily be pushed to the floor.

The explanation of the apparent mystery is to be found in the scientific fact of the pressure of the atmosphere. The air presses upon everything on the surface of the earth with a force equal to 15 pounds on every square inch. But this pressure is unnoticed by us in ordinary circumstances, because it works equally in all directions.

When, however, the pressure of the air is removed from one side of a body, it is felt with great force on the other side. It is this removal of the air-pressure from one side that happens when we strike the projecting board.

The blow is given sharply, and the air has no time to rush in between the table and the newspaper. The result is that the pressure of 15 pounds to the square inch is exerted in a downward direction only, upon the surface of the newspaper, and when we strike the end of the board this pressure is felt just as though the other end of the board were held down by heavy weights. It must, of course, be understood that the blow is to be short and sharp, the fist being removed from the board instantly. If the blow is a prolonged one, and the hand rests upon the board for more than a moment, it will go down, because that is the same as deliberately pressing upon the board. The air has no time to rush in under the board, and the pressure of the atmosphere then being the same both below and above the board, there is nothing to counteract our blow as is the case when we strike sharply and quickly, and the air-pressure is exerted on the top of the board only.

CARDS THAT CAN GUESS NUMBERS

IF we take six visiting cards, and copy on them the six sets of figures that are printed below—one set on each card—we shall be able, with the six cards that we have made, to tell any number that a friend may have thought of.

We ask the friend to think of a number, and then we show our six cards, desiring that he will point out on which of these cards the number thought of appears. In a moment we tell him the number, much to his astonishment.

The explanation is very simple. We merely add up the figures that appear on the top right-hand corners of the cards upon which his number appears, and the total that results is the number thought of. Thus, suppose that our friend thought of the number 47. It is on the first, second, third, fourth and sixth cards. The figures in the top right-hand corners of these are 1, 4, 8, 2, and 32, which, added together, make 47—the number thought of. We can guess people's ages in this way, and can get a great deal of fun from so simple a set of figure cards.

Some people know of figure cards by which a number can be guessed, but these are usually arranged so that the top *left*-hand figures have to be added to give the solution, whereas here the *right*-hand numbers must be added. If any of our friends have seen figure-guessing cards before, they will at once say that they can do the thought-reading as skillfully as ourselves. We let them try, and by adding up the *left*-hand figures they find that they are wrong every time.

3	5	7	9	11	1
13	15	17	19	21	23
25	27	29	31	33	35
37	39	41	43	45	47
49	51	53	55	57	59

5	6	7	13	12	4
14	15	20	21	22	23
28	29	30	31	36	37
38	39	44	45	46	47
52	53	54	55	60	13

9	10	11	12	13	8
14	15	24	25	26	27
28	29	30	31	40	41
42	43	44	45	46	47
56	57	58	59	60	13

3	6	7	10	11	2
14	15	18	19	22	23
26	27	30	31	34	35
38	39	42	43	46	47
50	51	54	55	58	59

17	18	19	20	21	16
22	23	24	25	26	27
28	29	30	31	48	49
50	51	52	53	54	55
56	57	58	59	60	31

33	34	35	36	37	32
38	39	40	41	42	43
44	45	46	47	48	49
50	51	52	53	54	55
56	57	58	59	60	46

HOW TO DANCE MORRIS DANCES

OF the Morris Dances referred to on page 3504 we are explaining here the movements of two.

Laudnum Bunches is a corner dance, and many of the movements are typical of other dances. The dancers wave a handkerchief in each hand, holding it in one corner between the thumb and fingers, and wave it from the wrist with the arm upraised, as shown in picture 1. Some dancers secure it by twisting it round the finger. Laudnum Bunches seems a strange name for a dance. "Laudnum" is possibly a contraction of laudanum, a sweet-smelling gum used in making scented powder. The connection of a scented powder with handkerchiefs is accounted for.

The six dancers stand in two files and jump. Then the two files advance, so that the last couple are in the same spot as that where the first couple were before. Handkerchiefs are flung up while dancing at the fourth count of the step. The couples then retire and turn to dance facing the other way. The music is in six-eight time for these different movements, and just as the dancers get back to their original position they jump in half turning so as to face each other again.

With the change of music the movement called Corners starts. This reminds one of the familiar Sir Roger de Coverley dance.

The dancers stand facing each other, and Nos. 1 and 6 advance to pass each other and change corners, dancing the Morris step, and tossing up handkerchiefs, as shown in picture 1.

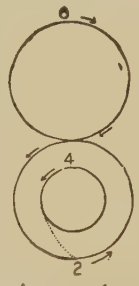
1. Tossing up handkerchiefs in the Corners figure.

Then, turning about, they face one another, and again approach as before, but only to the centre, and then retire to the same corners waving their handkerchiefs round their heads, and finally take a jump. Nos. 2 and 5 do exactly the same as the first couple.

Then Nos. 3 and 4 do just the same as the other two couples have done. All the dancers are now in opposite places. The music then changes to the original tune, and the dancers stand in file ready to start the Chain, which is practically a figure 8, and is a movement which is quite unlike the chain in the Lancers, where the dancers join hands, Nos. 1, 3 and 5

2. Back-to-back movement in Laudnum Bunches.

forming an S, and Nos. 2, 4 and 6 doing likewise. This is shown by a diagram below illustrating the movements of Nos. 2, 4 and 6.



The path of No. 4 is shown inside the path of No. 2 for the sake of clearness, but when No. 4 comes to the starting-place of No. 2 she begins following in the path of that dancer. Likewise No. 6 follows the path of No. 4 part of the way. At the middle of the chain the partners jump round to face each other again. The movements are reversed to finish the chain. Nos. 1, 3 and 5 dance the chain in the same way as their partners, but from opposite angles.

Next, the Corners are repeated. Following that is Crossing-over as in Bean-setting.

The next part of Laudnum Bunches shows the "high" step. Partners stand facing each other, and Nos. 1 and 6 start the Capers. They advance toward each other, handkerchiefs flung up as in Corners, jump in the centre, then pass on to each other's corners, hopping alternately on left and right feet, and keeping knees stiff and feet high. Then they turn round to face and advance halfway. The time changes, and they retire, waving the handkerchiefs round the head and dancing the same step as in Corners. Then they jump. The other couples do likewise.

The Back-to-back movement is like that in Bean-setting. It is shown in picture 2, where the couples are dancing back to back round their partners. The repetition of Capers brings partners into their right corners again.

At the signal "All in," when the last couple is finishing, the dancers close in toward the centre, and as the music ends, toss up their handkerchiefs and make the "call."

THE DANCE CALLED BEAN-SETTING

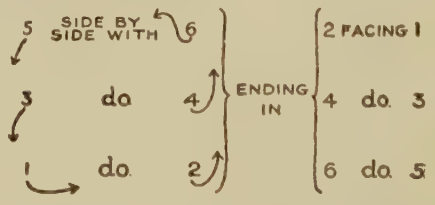
THE dance Bean-setting is so called because it illustrates the planting of beans in spring, and thus joyously celebrates the hopeful seed-sowing. Six dancers stand in two-file form, each with a short stick in the right hand, held like a pencil, as shown in picture 3, and crossed with the partner's stick. The partners face each other. The sticks replace the swords

3. Tapping sticks in the Ring figure in Bean-setting.

used in the ancient dance. The music of this dance starts with twelve-sixteen time, and the sticks are tapped on the ground or crossed in time with it. The dancers in their movements cover a space of about twelve feet each way.

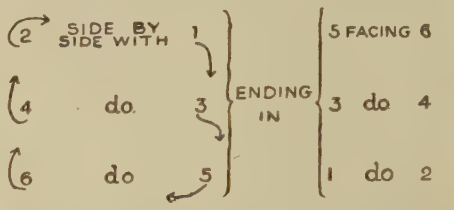
Dancer No. 1 is the leader, who calls out the figure or movement and makes known to his five comrades the end of the dance by the call "All in."

The first figure, named the Ring, starts by partners tapping sticks as shown in picture 3; then all the dancers form a ring, Nos. 3 and 4 moving a little out from their places, and then the whole six dancing in step to form half the ring. They then tap partners' sticks and circle the other way. If the pairs of sticks strike all at the same moment the time is well kept and the effect is good. The change which then takes place to jump into the position facing the music in two files is shown by the following diagram:



The arrows show how the ring is made, and the column on the right hand shows the new positions that are taken by the dancers.

In the second half the ring starts forming again, but when the dancers step out they do so in the reverse direction, as shown here:



It must be noticed that when the dancers arrive in position facing each other, halfway through and also at the end, they make a half-turn jump into the file position again, and tap sticks across.

The next figure, Dibbing, imitates making holes for the setting or planting of beans. The music changes, and the partners face each other in two lines, holding the sticks in their right hands pointed down, and stooping forward. The stick is dibbed, or struck twice on the ground. The dancers stoop, and partners cross their sticks and tap them, letting the sticks remain crossed as seen in picture 3.

Dancers then tap their partners' sticks again, but instead of letting the sticks remain crossed, No. 1 taps No. 3, No. 3 taps No. 5, No. 5 taps No. 6. With the change of music No. 6 taps No. 4, No. 4 taps No. 2, and this tapping all round ends by partners tapping and crossing sticks. Sometimes the Chain described in Laudnum Bunches is danced here to lengthen the dance.

The name of the next figure, Crossing-over, indicates the movement. Partners face, cross over and take each other's place, dancing the Morris step. For instance, Nos. 1 and 2 dance to opposite places, keeping each other on the right, and end by turning and facing each other, as shown in this diagram. Then all the couples dance in step round to the right in order that partners may get into the original position, facing each other again, and tap across. Nos. 1 and 2, for instance, then dance like this:

Dibbing is now repeated.

In the Back-to-back movement partners advance and pass each other with right shoulders opposed, turn to the right halfway round each other back to back, and, with left shoulders opposed, retire into position backward. Nos. 1 and 2 move like this:

Tapping partners follows with the change of music. The movement of advancing and retiring is repeated, but partners dance forward to the right of each other, opposing left shoulders in advancing, right on retiring.

Dibbing is repeated for the second time. Crossing-over is sometimes repeated here, and is followed by Dibbing again. At the call "All in," and as the music ends, the dancers form in two files with their sticks crossed.

THE NEXT THINGS TO MAKE AND TO DO ARE ON PAGE 6955.

LITTLE TINY THUMBELINE

CONTINUED FROM 6612

ONCE upon a time there lived a young wife who longed to possess a little child, so she went to a fairy and said to her: "I wish very much to have a child, a little tiny child. Will you give me one, dear fairy?"

"With all my heart," replied the fairy. "Sow this barleycorn in a flowerpot, and then see what will happen."

"Thank you, thank you!" cried the woman, giving the fairy a silver coin. Then home she went, and planted the barleycorn, and immediately there shot up a large flower like a tulip, with its petals tightly closed like a bud.

"What a lovely flower!" said she, and kissed it. The bud opened at once with a cry, and there, in the centre of the flower, sat a little tiny girl about an inch high, scarcely bigger than her thumb. The wife called her Thumbeline, and put her to bed in a walnut-shell, with violet-leaves for her mattress and a rose-leaf for a quilt. During the day she told Thumbeline stories, and taught her to sing, as she played on the table beside her.

But one night a great, wet, ugly toad came and stole away the cradle with little Thumbeline asleep in it, and carried it off to her home in the muddy bank of the brook that flowed past the end of the garden.

"This is just the wife for my son," thought she. But when her ugly son saw her, all he could say was "Croak, croak, croak!"

"Don't make so much noise, or you'll wake her," said old Mother Toad. "She may easily escape, for she is as light as a feather. We must take her out and place her on one of the large water-lily leaves in the middle of the brook, while I prepare the house for you both."

This they did, and when poor little Thumbeline awoke and found herself in the middle of the stream, she cried most bitterly.

As soon as old Mother Toad had decorated her home with bulrushes and yellow buttercups, she and her hideous son swam out to the leaf to fetch the cradle so as to place it in its new home before taking the little maid herself there.

Old Mother Toad bowed low in the water, and said: "Here is my son, who is going to be your husband. I shall come for you soon, and you will be very happy together."

Then they swam off with the cradle, and poor, terrified Thumbeline wept bitterly. Now, some little fishes had overheard old Mother Toad, and when they saw the little maid so sad they gnawed away the stem of the leaf, and away it floated down the stream, so fast that the toad could not catch

it. Thumbeline became happy again, for everything she passed was lovely in the sunshine, and the birds on the branches sang to her as she floated by. A pretty little butterfly hovered round her, and at last settled for a moment on the leaf, for he loved her very much. She was pleased with him and tied him to the leaf with her sash.

But presently a great ugly cockchafer came buzzing past. He caught sight of her, and snatching her off the leaf, flew up with her into a tree; but the poor butterfly could not free himself, and went floating along downstream. The cockchafer gave Thumbeline some honey to eat, and praised her beauty; but when the henchafers saw her, they said that she was just like a human being.

"How very, very ugly she is!" they all cried; and at last the cockchafer disowned her, and they all flew down and set her on a daisy. Then she wept because she was so ugly that the henchafers would have nothing to do with her.

All the summer Thumbeline lived alone in a wood, dining off the honey from the flowers, and drinking the dew that every morning spangled the leaves around her. But then came the cold, cold winter; the flowers all died, the birds flew away, and the snow began to fall. Poor hungry Thumbeline wandered through the stubble of a grain-field hard by until she came to the hole of a field-mouse, who lived snugly down in the ground, with a room full of wheat, and a kitchen and storeroom. Thumbeline stood at the door and begged for food.

"Poor little thing!" said the good-natured field-mouse. "Come into my warm room and dine with me." And she soon became so fond of the tiny maid that she said: "You may dwell with me all the winter, if you will only keep my room clean and neat, and tell me stories, for I love stories dearly." And Thumbeline agreed, and was very happy in her new home.

In a few days' time the field-mouse said: "We shall have my next-door neighbor, the mole, in to visit us to-morrow; he comes to see me once a week. He is richer than I am, has large rooms in his house, and wears a beautiful black velvet coat. It would be capital if you married him; but he is blind, and cannot see you, so you must tell him your prettiest stories."

When he came, Thumbeline sang to him, and he soon fell in love with her. He invited them to his house, and led them down a dark passage that he had just burrowed from their house to his, lighting their way with a piece of tinder.

But when they had gone a short distance they found a swallow lying stretched on the floor; the poor bird had evidently died of cold. Thumbeline felt very sorry, for she loved all the birds, but the mole kicked it, saying:

"Here's a fine end to all its whistling! What a miserable thing it must be to be born a bird! None of my children will be birds, thank goodness!"

But Thumbeline could not sleep that night, so she got up, and wove a carpet out of dried grass, and went and spread it underneath the bird and covered him with warm, soft cotton.

"Farewell, dear bird," said she; "farewell, and thank you for your beautiful song in the summer, when all the trees were green and the sun shone so warmly upon us." As he spoke she pressed her head against his soft body, and to her great surprise she felt his heart beat weakly. The bird was not really dead. Joyfully she tucked the cotton closely round him with her little hands, and as he felt the warmth he gradually revived.

He lived underground all winter, and Thumbeline was kind to him and brought him water and food; but she never said a word either to the mole or the field-mouse.

As soon as the spring came the swallow said farewell to Thumbeline, who would not go with him, because she knew it would sadden the old field-mouse if she left her.

Thumbeline was now sorrowful indeed, for she was not allowed to go into the warm sunshine.

"This summer you must work and make your wedding clothes," said the field-mouse, for the blind, dull mole had decided to marry Thumbeline.

So the tiny maid was obliged to work hard at the distaff, and the field-mouse hired four spiders to spin and weave.

Every evening the mole came and talked about how the summer was coming to an end, and he abused the sun and pretty flowers so much that Thumbeline disliked him more and more, and at last said she would not marry him.

THUMBELINE FLOATED DOWN THE STREAM

Thumbeline became happy again, for everything she passed was lovely in the sunshine, and the birds on the branches sang to her as she floated by with her butterfly tied to the water-lily leaf with her sash.

"Fiddlestick!" cried the field-mouse. "Don't be obstinate, child, or I will bite you with my white teeth."

At last the day fixed for the wedding came, and Thumbeline went to bid farewell to the beautiful sun before going to dwell with the mole deep down in the earth.

"Farewell, bright sun!" she cried, and as she turned back into the gloom, her tears fell fast.

"Tweet, tweet!" And she heard a fluttering of wings, and there was the little swallow.

"The cold winter will soon be here again," said the swallow. "Let me save you, and take you to a land of sunshine. Come with me, sweet little Thumbeline. You saved my life when I lay frozen in the dark earth."

"Yes, I will go with you," she said; and she seated herself on the bird's back, and the swallow soared high into the air and flew away over forest, lake and mountain, until they reached a warm, sunny land. There the sky seemed twice as high and twice as blue, and there grew the loveliest green and purple grapes, and citrons, and melons. Near a calm, blue lake stood a half-ruined palace of white marble, and here the swallow had built her nest.

"This is my house," she said, "but I will take you to the garden of flowers that grows beneath us, and you shall make your home there."

But what was Thumbeline's surprise when she saw, sitting on a flower, a tiny little manikin, no bigger than herself. On his head he wore a bright gold crown, and from his shoulders grew a pair of delicate gauzy wings. He was the spirit of the flowers; in every flower there lived a fairy, and he was their king.

ALL THE FAIRIES CAME OUT AND BROUGHT THUMBELINE GIFTS

When he saw Thumbeline he was delighted, for he had never seen so lovely a maiden. He asked her to be his queen, and when Thumbeline said yes, he took his crown and placed it on her head. Then all the fairies brought her gifts, and best of all was a pair of shimmering wings, for with these she could fly from flower to flower. "I shall not call you Thumbeline," said the fairy king; "you are too sweet and gentle for such an ugly name. My name for you shall be Maia."

And she dwelt with him in great happiness ever after.

THE THIEF WHO TURNED POLICEMAN

WHEN Vidocq made up his mind to break away from the burden of his past, as we read on page 6479, there was only one way by which he could escape from prison and remain a free man. If he escaped by a hole in the wall, by bribery of jailers, by disguise, or by any other of the hundred and one ways which had made him notorious, it would only be to find himself hunted down by the whole police force. No; there was but one way. He must become a policeman himself.

So he made his offer to the Chief of Police at Paris, and was presently released. Instead of a convict he became a spy. He was free, but his freedom lay in capturing villains. So long as he lived, destiny seemed to insist that his life should have to do with crime. The Chief of Police let him free on condition that he brought a certain number of criminals to justice every month. His release was cleverly managed. He was taken from the prison in a car, and, wearing handcuffs, was driven at a rapid pace some distance through the city to a quiet place, where his handcuffs were taken off, and he was then allowed to escape. Far and wide spread the news that the notorious Vidocq had once more escaped; and Vidocq lived for some time in the company of thieves and other criminals in Paris and other places, making a study of their methods. How he must have smiled as they praised this last wonderful escape!

One of his first adventures was desperate. He received an invitation from a criminal named St. Germain to join with him and two others in raiding the house of a banker. St. Germain was not an ordinary burglar. He had been a clerk, was well-mannered, skillful, brave, and supposed to be a favorite in polite society. Vidocq thought to himself: "Here is a very easy plan for me to take all these scoundrels together"; and he consented to join the venture.

AS SOON AS THE CUNNING SEXTON LAID DOWN THE SPADE VIDOCQ PICKED IT UP

But, to his discomfiture, he found that the burglary was to take place that night, and that St. Germain insisted on all four conspirators remaining at his lodgings till the hour came to sally out. Vidocq therefore had no chance of preparing a scheme; and, moreover, if caught by the police, he would have the greatest difficulty in proving satisfactorily to them that he was only working as a spy.

The others began to sharpen knives and clean pistols. Vidocq threw himself lazily upon a bed. He said presently that he had at his rooms some bottles of good wine, which would make the hours pass. A porter was dispatched to Vidocq's wife telling her to bring the wine.

While this man was on his way Vidocq, lying on the bed, wrote a secret line for Annette, his wife, telling her to follow him in disguise and pick up anything he dropped. When she arrived with the wine, pretending to kiss her, he slipped this little screw of paper unobserved into her hand. Later in the day he suggested that it would be a good thing to inspect the house they intended to rob while it was daylight. They knew it, but he did not. He liked to know where he was going.

The others agreed, and they went forth. Vidocq saw the place, and that was enough for him. On the way back St. Germain entered a shop to buy black crêpe for their faces, and Vidocq hastily wrote a few lines for the police. As they walked home together, Vidocq dropped this paper, his wife picked it up, and a few minutes later it was in the hands of the police officials.

When it was midnight the four men started out. They made their way quickly through the deserted streets and came presently to the wall surrounding the house. All was still. They donned their crêpe masks and set to work. They climbed one by one up the wall. Three of them dropped noiselessly down into the shrubs on the other side. Vidocq remained for a moment astride the wall. Suddenly out of the bushes sprang a force of police. The burglars fired their pistols, injuring some of the police; and Vidocq rolled off the wall as if shot by a bullet. The burglars were captured, but Vidocq was unhurt.

And now comes the story of an old sexton, greatly trusted for his piety, and highly respected by the priest and people of his parish. The priest, fearing the coming of the Cossacks, determined to bury the church plate. Another parishioner, a rich goldsmith, determined to bury all his jewels with the sacred plate. Who but the pious sexton should dig the hole? The hole was dug, the treasure buried, and the sexton crawled off to his duties. But one day he came crying to the priest: "The hole! The hole!" And, lo! there it lay open and empty—the treasure gone! No one could discover the thief, and the matter was at last intrusted to Vidocq. When he had heard the story he said: "Arrest the sexton." And the pious sexton was arrested on suspicion. Then Vidocq disguised himself as a Jew peddler, and one day presented himself casually at the door of the sexton's cottage. He offered things to sell, and offered to buy anything the sexton's wife might have in the house. But the old woman offered neither plate nor jewel.

The next step was to disguise himself as a German valet, and to get arrested and thrown into the same cell as the old sexton. At first the sexton would have little to do with his fellow-prisoner, but when Vidocq showed him that he had a gold coin sewn inside each of his buttons, and when, further, he called for a bottle of wine, the sexton became more friendly, and they exchanged stories.

Vidocq said he had buried some valuables belonging to his master in a wood, and when he got out of prison he would get those valuables, escape to Germany, and live a merry life.

The sexton said that he was tired of his wife, and that if he could escape he, too, would go to Germany and live a merry life. Vidocq was now certain that the crafty old fellow had got the treasure. He instructed the police to move them to another prison, and to bind them so loosely that they could escape. This was done. The spy and the sexton escaped into the woods, and then the sexton came to the place where the treasure had been buried.

A spade was concealed in some bushes, and with this he dug up the spoil. As soon as he laid down the spade Vidocq picked it up and said quietly that he would knock the sexton on the head if he resisted. Marched off to prison, the old sexton kept on muttering to himself: "Who could have believed it? He looked so simple!"

For nearly twenty years Vidocq lived this exciting and dangerous life. It is asserted that he captured as many as 20,000 criminals in the rookeries of Paris alone. In 1812 Vidocq became the head of a detective agency in Paris, which proved successful; but it was thought that Vidocq himself originated many of the burglaries that he showed such ingenuity in detecting, so, after thirteen years in office, he was superseded.

After one or two other ventures in trade, Vidocq at length became a lecturer. He came as a lecturer to London, and was a marvelous success. He lived to be eighty-two years of age, and kept himself in comfort to the end of his days by the money he earned in London.

JACK THE GIANT-KILLER

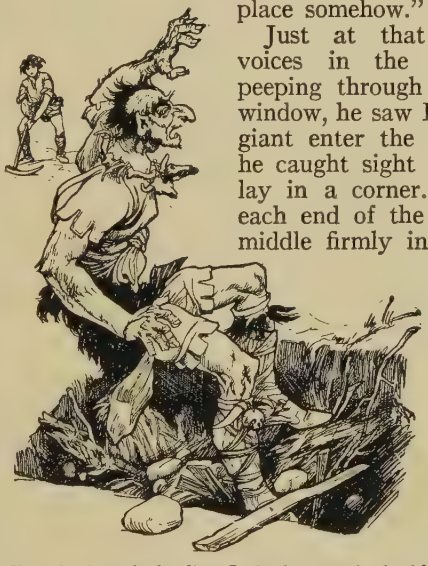
IN the days of King Arthur there lived a farmer's son named Jack. Not far away from Jack's home was a cave, and in the cave lived a horrible giant called Cormoran.

Cormoran was three times as big as any other man; his appetite was so enormous that the only way he could get enough food to eat was by stealing all the sheep and oxen he could find. For one meal the giant could eat as much as six oxen and twelve sheep, and Jack's father said that if this went on much longer all the farmers for miles round would be ruined.

This set Jack thinking, and being a brave lad, he determined to find a way to kill the monster.

So one night he set out for the mountain in which was the giant's cave. With a spade he dug a deep pit and covered it with sticks and gravel, so that it looked like earth. Then, when all was ready, he blew a loud blast on his cow-horn and waited.

The giant awoke in a terrible rage, and came stamping down the mountain to see who had dared to come so near his cave. Suddenly he caught sight of Jack.



The giant rushed after Jack, but suddenly his foot caught in the pit, and down he came, crash!

"You young rascal!" he cried in an awful voice. "I'll kill you and eat you for my supper!"

He rushed after Jack, but just before he reached him his foot caught in the pit, and down he came, crash! Up jumped Jack, and in a twinkling he drew out his ax and chopped off Cormoran's head.

Jack ran all the way home, and the farmers were so delighted at being rid of the monster that they presented the hero with a sword, and named him "Jack the Giant-killer."

Jack was so proud of his success that he determined to rid the world of another monster, named Blunderbore, who lived in a castle in the midst of a lovely forest.

Jack set out bravely, but the day was warm, and he had not gone very far when, overcome by the heat, he lay down under a tree and fell asleep. Soon Blunderbore came along, and catching sight of Jack, he picked him up, flung him over his shoulder, and carried him to his castle.

When Jack awoke and found himself in the giant's castle, he was in terror. Through the window he could hear the cries and groans of the giant's other victims, and his teeth began to chatter.

"This is dreadful," he said to himself. "I must find a way out of this place somehow."

Just at that moment Jack heard voices in the courtyard below, and peeping through the rails of his prison window, he saw Blunderbore and another giant enter the castle. Looking round, he caught sight of a coil of rope which lay in a corner. He made a noose at each end of the rope, and grasping the middle firmly in his hand, he flung an end over the two giants' heads. Quick as lightning he swung the rope round a beam by the window, and then, holding on to it with all his might, he pulled it tight until both giants were strangled.

Jack set free all the knights and ladies whom Blunderbore had imprisoned in his castle, and set out again upon new adventures.

The next evening he found himself at the door of a lonely castle in Wales. He knocked, and, to his amazement, the door was opened by a tremendous giant with two heads. Jack was startled, but the giant seemed so friendly that when he offered him a bed for the night Jack gladly accepted.

Now, Jack knew that this two-headed monster had four valuable treasures, which he determined to possess—a coat that made the wearer invisible, a cap that told him all he wanted to know, a sword that could cut anything, and shoes that could carry him as swiftly as the wind. Jack went to bed, and

soon fell asleep. In the middle of the night he was awakened by someone singing; and this is what he heard:

"Though you shall lodge with me this night,
You shall not see the morning light;
My club shall dash your brains out quite."

"Ho, ho!" cried Jack, looking round for a log of wood which he had noticed by the fireplace. Jack put the log in his bed, and waited. Presently the door opened, and in came the giant and strode up to the bed. Down came the club—crash; again and again.

"Farewell, my young friend," he bellowed. "You'll make me a fine dinner by and by."

Jack had a good laugh over this, and when the giant had gone he crept back into bed, and was soon fast asleep.

In the morning Jack walked boldly into the room where the giant was breakfasting from a huge basin of batter pudding. The giant was so astonished at seeing Jack alive that he scarcely knew what to say to him.

Jack sat down, and began to eat a good breakfast. But all the time he ate he was thinking. Suddenly a grand idea came into his mind, and when the giant was not looking he hid as much of the pudding in his jersey as he could possibly get, so that he seemed to eat as much as the giant.

Jack flung the noose over the heads of the giants and held on to it with all his might and main.

As soon as breakfast was over, Jack said: "*You* can't plunge a knife into your chest without hurting yourself. See *me!*"

Picking up a knife, Jack thrust it into his jersey, and out fell the pudding, piece by piece, upon the floor.

The giant did not like to be outdone by such a little creature as Jack, so he drew out his own knife, and, without more ado, plunged it into his chest—and fell down dead.

Then Jack caught up the cap and the shoes and the coat and the sword, and went on his way.

At the next castle to which he came a great ball was taking place. The knights and ladies, who had all heard of Jack, made him welcome, and he was just beginning to enjoy himself when in rushed a messenger to say that a hideous giant was on his way to the castle.

"Have no fear," cried Jack, fastening on his invisible coat. "Leave all to me."

He put on the shoes which carried him as quickly as the wind, and went out.

Round the castle ran a moat, and when the giant reached the drawbridge that stretched across it he sniffed the air around, and roared in an awful voice:

"Fe, fi, fo, fum,
I smell the blood of an Englishman;
Be he alive, or be he dead,
I'll grind his bones to make my bread."

"You must catch me first," cried Jack; and then throwing off his coat, he led the giant a fine dance round the castle.

Jack ran on swiftly until he came again to the drawbridge. He ran across, but as he reached the other side he bent down, and with one stroke of his magic sword severed the bridge in two just as the giant was halfway across. Down crashed the drawbridge, and into the moat fell the giant; and that was the end of him.

Jack had many other adventures, and when he was tired of them all he went home again and married a beautiful princess whom he loved dearly.

And they lived happily ever after.

THE NEXT STORIES ARE ON PAGE 6941.

A PROPHECY OF THE FUTURE

IN this poem, written nearly fifty years ago, John Townsend Trowbridge gives a very amusing account of the first American flying-machine. In the days when he wrote it, the hero was ahead of his time in being of the opinion "that the air is also man's dominion," but there are many to-day reaping the results of early work like his. Darius scorned to let the swallow and blackbird and wren know more than he knew. He believed that wings were just as necessary to him in earning his living as they were to the bee, and so he set to work and made some—with what result you will see!

DARIUS GREEN AND HIS FLYING-MACHINE

CONTINUED FROM 6756

IF ever there lived a
Yankee lad,
W i s e or otherwise,
good or bad,
Who, seeing the birds
fly, didn't jump
With flapping arms from stake or
stump,
Or, spreading the tail
Of his coat for a sail,
Take a soaring leap from post or rail,
And wonder why
He couldn't fly,
And flap and flutter and wish and try,—
If ever you knew a country dunce
Who didn't try that as often as once,
All I can say is, that's a sign
He never would do for a hero of mine.

An aspiring genius was D. Green:
The son of a farmer,—age fourteen;
His body was long and lank and lean,—
Just right for flying, as will be seen;
He had two eyes, each bright as a bean,
And a freckled nose that grew between,
A little awry,—for I must mention
That he had riveted his attention
Upon his wonderful invention,
Twisting his tongue as he twisted the
strings,
Working his face as he worked the wings,
And with every turn of gimlet and screw
Turning and screwing his mouth round
too,
Till his nose seemed bent
To catch the scent,
Around some corner, of new-baked pies,
And his wrinkled cheeks and his squinting
eyes
Grew puckered into a queer grimace,
That made him look very droll in the face,
And also very wise.

And wise he must have been, to do more
Than ever a genius did before,
Excepting Dædalus of yore
And his son Icarus, who wore
Upon their backs
Those wings of wax
He had read of in the old almanacs.

Darius was clearly of
the opinion,
That the air is also
man's dominion,
And that, with paddle
or fin or pinion,
We soon or late
Should navigate
The azure as now we sail the sea.
The thing looks simple enough to me;
And if you doubt it,
Hear how Darius reasoned about it:

"Birds can fly,
An' why can't I?
Must we give in,"
Says he with a grin,
"'T the bluebird an' phœbe
Are smarter'n we be?
Jest fold our hands an' see the swaller
An' blackbird an' catbird beat us holler?
Does the leetle chatterin', sassy wren,
No bigger'n my thumb, know more than
men?
Jest show me that!
Er prove 't the bat
Hez got more brains than's in my hat,
An' I'll back down, an' not till then!"

He argued further: "Ner I can't see
What's th' use o' wings to a bumble-bee,
Fer to git a livin' with, more'n to me;—
Ain't my business
Importanter'n his'n is?

"That Icarus
Was a silly cuss,—
Him an' his daddy Dædalus,
They might 'a' knowed wings made o' wax
Wouldn't stan' sun-heat an' hard whacks.
I'll make mine o' luther,
Er suthin' er other."

And he said to himself, as he tinkered and
planned:
"But I ain't goin' to show my hand
To nummies that never can understand
The fust idee that's big an' grand.
They'd 'a' laft an' made fun
O' Creation itself afore 'twas done!"

So he kept his secret from all the rest,
Safely buttoned within his vest;
And in the loft above the shed
Himself he locks with thimble and thread
And wax and hammer and buckles and screws
And all such things as geniuses use;—
Two bats for patterns, curious fellows!
A charcoal-pot and a pair of bellows;
An old hoop-skirt or two, as well as
Some wire, and several old umbrellas;
A carriage-cover, for tail and wings;
A piece of harness; and straps and strings;
And a big strong box,
In which he locks
These and a hundred other things.

His grinning brothers, Reuben and Burke
And Nathan and Jotham and Solomon, lurk
Around the corner to see him work,—
Sitting cross-leggèd, like a Turk,
Drawing the waxed end through with a jerk,
And boring the holes with a comical quirk
Of his wise old head, and a knowing smirk.
But vainly they mounted each other's backs,
And poked through knot-holes and pried through cracks;
With wood from the pile and straw from the stacks
He plugged the knot-holes and calked the cracks;
And a bucket of water, which one would think
He had brought up into the loft to drink
When he chanced to be dry,
Stood always nigh,
For Darius was sly!
And whenever at work he happened to spy
At chink or crevice a blinking eye,
He let a dipper of water fly:

"Take that! an' ef ever ye get a peep,
Guess ye'll ketch a weasel asleep!"
And he sings as he locks
His big strong box:—

Song

"The weasel's head is small an' trim,
An' he is leetle an' long an' slim,
An' quick of motion an' nimble of limb,
An' ef yeou'll be
Advised by me,
Keep wide awake when ye're ketchin' him!"

So day after day
He stitched and tinkered and hammered away,
Till at last 'twas done,—
The greatest invention under the sun!
"An' now," says Darius, "hooray fer some fun!"

'Twas the Fourth of July,
And the weather was dry,
And not a cloud was on all the sky,
Save a few light fleeces, which here and there,
Half mist, half air,
Like foam on the ocean went floating by:
Just as lovely a morning as ever was seen
For a nice little trip in a flying-machine.

Thought cunning Darius: "Now I sha'n't go
Along 'ith the fellers to see the show.
I'll say I've got sich a terrible cough!
An' then, when the folks 'ave all gone off,
I'll hev full swing
Fer to try the thing
An' practyse a leetle on the wing."

"Ain't goin' to see the celebration?"
Says Brother Nate. "No; botheration!
I've got sich a cold—a toothache—I—
My gracious!—feel's though I should fly!"
Said Jotham, "Sho!
Guess ye better go."
But Darius said, "No!
Shouldn't wonder 'f yeou might see me though,
'Long 'bout noon, ef I git red
O' this jumpin', thumpin' pain 'n my head!"
For all the while to himself he said:—

"I tell ye what!
I'll fly a few times around the lot,
To see how 't seems, then soon 's I've got
The hang o' the thing, ez likely 's not,
I'll astonish the nation
An' all creation
By flyin' over the celebration!
Over their heads I'll sail like an eagle;
I'll balance myself on my wings like a sea-gull;
I'll dance on the chimbleys; I'll stan' on the steeple;
I'll flop up to winders an' scare the people!
I'll light on the libbe'ty-pole, an' crow;
An' I'll say to the gawpin' fools below,
'What world's this 'ere
That I've come near?'
Fer I'll make 'em b'lieve I'm a chap f'm the moon!
An' I'll try a race 'ith their ol' bulloon."

He crept from his bed;
And, seeing the others were gone, he said,
"I'm a-gittin' over the cold 'n my head."
And away he sped,
To open the wonderful box in the shed.

His brothers had walked but a little way
When Jotham to Nathan chanced to say,
"What on airth is he up to, hey?"
"Don'o',—th' 's suthin' er other to pay,
Er he wouldn't 'a' stayed to hum to-day."
Says Burke, "His toothache's all in his eye!
He never'd miss a Fo'th-o'-July,
Ef he hedn't got some machine to try."
Then Sol, the little one, spoke: "By darn!
Le's hurry back an' hide 'n the barn,
An' pay him fer tellin' us that yarn!"
"Agreed!" Through the orchard they creep back,
Along by the fences, behind the stack,
And one by one, through a hole in the wall,
In under the dusty barn they crawl,
Dressed in their Sunday garments all;
And a very astonishing sight was that,
When each in his cobwebbed coat and hat
Came up through the floor like an ancient rat.
And there they hid;
And Reuben slid
The fastenings back, and the door undid.
"Keep dark!" said he,
"While I squint an' see what the' is to see."

As knights of old put on their mail,—
From head to foot
An iron suit,
Iron jacket and iron boot,
Iron breeches, and on the head
No hat, but an iron pot instead,
And under the chin the bail,—
I believe they called the thing a helm;
And the lid they carried they called a shield;
And, thus accoutred, they took the field,
Sallying forth to overwhelm
The dragons and pagans that plagued the realm:—
So this modern knight
Prepared for flight,
Put on his wings and strapped them tight;
Jointed and jaunty, strong and light;
Buckled them fast to shoulder and hip,—
Ten feet they measured from tip to tip!
And a helm had he, but that he wore,
Not on his head like those of yore,
But more like the helm of a ship.

"Hush!" Reuben said,
"He's up in the shed!
He's opened the winder,—I see his head!
He stretches it out,
An' pokes it about,
Lookin' to see 'f the coast is clear,
An' nobody near;—
Guess he don'o' who's hid in here!
He's riggin' a spring-board over the sill!
Stop laffin', Solomon! Burke, keep still!
He's a-climbin' out now—Of all the things!
What's he got on? I van, it's wings!
An' t' other thing? I vum, it's a tail!
An' there he sets like a hawk on a rail!
Steppin' careful, he travels the length
Of his spring-board, and teeters to try its strength.
Now he stretches his wings, like a monstrous bat;
Peeks over his shoulder, this way an' that,
Fer to see 'f the' 's any one passin' by;
But the' 's on' a ca'f an' a goslin' nigh.
They turn up at him a wonderin' eye,
To see—The dragon! he's goin' to fly!
Away he goes! Jimminy! what a jump!
Flop—flop—an' plump
To the ground with a thump!
Flutt'rin' an' flound'rin', all 'n a lump!"

As a demon is hurled by an angel's spear,
Heels over head, to his proper sphere,—
Heels over head, and head over heels,
Dizzily down the abyss he wheels,—
So fell Darius. Upon his crown,
In the midst of the barnyard, he came down,
In a wonderful whirl of tangled strings,
Broken braces and broken springs,
Broken tail and broken wings,
Shooting-stars, and various things!
Barnyard litter of straw and chaff,
And much that wasn't so sweet by half.

Away with a bellow fled the calf,
'Tis a merry roar
And, what was that? Did the gosling laugh?
From the old barn-door,
And he hears the voice of Jotham crying,
"Say, Darius! how de yeou like flyin'?"
Slowly, ruefully, where he lay,
Darius just turned and looked that way,
As he stanched his sorrowful nose with his cuff.
"Wal, I like flyin' well enough,"
He said, "but the' ain't sich a thunderin' sight
O' fun in 't when ye come to light."

Moral

I just have room for the moral here:
And this is the moral,—stick to your sphere;
Or, if you insist, as you have the right,
On spreading your wings for a loftier flight,
The moral is,—Take care how you light.

GIVE US MEN

The following spirited appeal to the nation to furnish true men to further the interests of the country is supposed to have been written by a bishop of Exeter.

GIVE us men!
Men from every rank,
Fresh and free and frank;
Men of thought and reading,
Men of light and leading,
Men of loyal breeding,
The nation's welfare speeding;
Men of faith and not of fiction,
Men of lofty aim in action;
Give us men—I say again,
Give us men!

Give us men!
Strong and stalwart ones;
Men whom highest hope inspires,
Men whom purest honor fires,
Men who trample self beneath them,
Men who make their country wreathe them
As her noble sons,
Worthy of their sires;
Men who never shame their mothers,
Men who never fail their brothers,
True however false all others;
Give us men—I say again,
Give us men!

Give us men!
Men who when the tempest gathers
Grasp the standard of their fathers
In the thickest fight;
Men who strike for home and altar,
(Let the coward cringe and falter,)
God defend the right!
True as truth though low and lonely,
Tender as the brave are only;
Men who tread where saints have trod,
Men for country, home and God;
Give us men—I say again,
Give us such men!

MY GARDEN

A GARDEN is a lovesome thing, God wot!
Rose plot,
Fringed pool,
Ferned grot—
The veriest school
Of peace; and yet the fool
Contends that God is not—
Not God! in gardens! when the eve is cool?
Nay, but I have a sign:
'Tis very sure God walks in mine.

—THOMAS EDWARD BROWN.

ULYSSES

One of the most interesting of all the legends of ancient Greece is that which tells of the wanderings of Ulysses. It is briefly given in the Story of Famous Books, on page 1984, and it might be well to read that together with this fine poem by Lord Tennyson. The poet is not here concerned with the adventures of Ulysses, or, indeed, with the hero of old Greece, except as a means to express the brave and daring spirit. For his song is really in praise of the man who cannot sit idle by his cozy hearth, but must roam abroad on quests ever new and wonderful..

IT little profits that an idle king,
By this still hearth, among these barren crags,
Match'd with an aged wife, I mete and dole
Unequal laws unto a savage race,
That hoard, and sleep, and feed, and know not me.
I cannot rest from travel: I will drink
Life to the lees: all times I have enjoy'd
Greatly, have suffer'd greatly, both with those
That loved me, and alone; on shore, and when
Thro' scudding drifts the rainy Hyades
Vext the dim sea: I am become a name;
For always roaming with a hungry heart
Much have I seen and known: cities of men
And manners, climates, councils, governments,
Myself not least, but honor'd of them all;
And drunk delight of battle with my peers,
Far on the ringing plains of windy Troy.
I am a part of all that I have met;
Yet all experience is an arch wherethro'
Gleams that untravell'd world, whose margin fades
For ever and for ever when I move.
How dull it is to pause, to make an end,
To rust unburnish'd, not to shine in use!
As tho' to breathe were life. Life piled on life
Were all too little, and of one to me
Little remains: but every hour is saved
From that eternal silence, something more,
A bringer of new things; and vile it were
For some three suns to store and hoard myself,
And this gray spirit yearning in desire
To follow knowledge like a sinking star,
Beyond the utmost bound of human thought.
This is my son, mine own Telemachus,
To whom I leave the sceptre and the isle—
Well-loved of me, discerning to fulfil
This labor, by slow prudence to make mild
A rugged people, and thro' soft degrees
Subdue them to the useful and the good.
Most blameless is he, centred in the sphere
Of common duties, decent not to fail
In offices of tenderness, and pay
Meet adoration to my household gods,
When I am gone. He works his work. I mine.
There lies the port; the vessel puffs her sail:
There gloom the dark broad seas. My mariners,
Souls that have toil'd, and wrought, and thought with me—
That ever with a frolic welcome took
The thunder and the sunshine, and opposed
Free hearts, free foreheads—you and I are old;
Old age hath yet his honor and his toil;
Death closes all; but something ere the end,
Some work of noble note, may yet be done,
Not unbecoming men that strove with gods.
The lights begin to twinkle from the rocks:
The long day wanes: the slow moon climbs: the deep
Moans round with many voices. Come, my friends,
'Tis not too late to seek a newer world.
Push off, and sitting well in order smite
The sounding furrows; for my purpose holds
To sail beyond the sunset, and the baths
Of all the western stars, until I die.
It may be that the gulfs will wash us down:
It may be we shall touch the Happy Isles,
And see the great Achilles, whom we knew.
Tho' much is taken, much abides; and tho'
We are not now that strength which in old days
Moved earth and heaven; that which we are, we are;
One equal temper of heroic hearts,
Made weak by time and fate, but strong in will
To strive, to seek, to find, and not to yield.

JOHN ANDERSON

This well-known song is a love-song—with a difference. In it Robert Burns pictures a happy couple toward the close of their married life; and it says much for the enduring affection each has cherished for the other that the old lady is able to sing so tenderly of her "Jo," or sweetheart. The Scots words in the song are easy to understand, but "brent," means smooth, or unwrinkled; "pow," head, and "canty," happy.

JOHN ANDERSON my jo, John,
When we were first acquent,
Your locks were like the raven,
Your bonnie brow was brent;
But now your brow is bald, John,
Your locks are like the snow;
But blessings on your frosty pow,
John Anderson my jo.

John Anderson my jo, John,
We clamb the hill thegither,
And mony a canty day, John,
We've had wi' ane anither;
Now we maun totter down, John;
But hand in hand we'll go,
And sleep thegither at the foot,
John Anderson my jo.

SILVIA

It has been said that when a character in one of Shakespeare's plays "favored" the audience with a song, this happened when the company contained a man who was both an actor and singer. These songs were not numerous, and one of the most charming is that here quoted. It occurs in The Two Gentlemen of Verona, and has been set to music worthy of it by the famous German composer Schubert.

WHO is Silvia? What is she,
That all our swains commend her?
Holy, fair, and wise is she;
The Heaven such grace did lend her,
That she might admirèd be.

Is she kind as she is fair?
For beauty lives with kindness:
Love doth to her eyes repair,
To help him of his blindness;
And, being helped, inhabits there.

Then to Silvia let us sing,
That Silvia is excelling;
She excels each mortal thing
Upon the dull earth dwelling:
To her let us garlands bring.

THE PATRIOT

The first line of this poem by Robert Browning is often quoted. The poem was written to illustrate the fickleness of popular applause. History abounds in examples of men who have been hailed as heroes by the mob and a little later have been hounded to death by the same mob. The finest illustration of how the ignorant mob can be swayed is to be found in Shakespeare's play of Julius Cæsar, by noting how the same people who applaud Brutus immediately turn and applaud his enemy, and their own worst friend, Mark Antony.

IT was roses, roses, all the way,
With myrtle mixed in my path like mad;
The house-roofs seemed to heave and sway,
The church-spires flamed, such flags they had
A year ago on this very day.

The air broke into a mist with bells,
The old walls rocked with the crowd and cries.
Had I said, "Good folk, mere noise repels;
But give me your sun from yonder skies!"
They had answered, "And afterward, what else?"

Alack, it was I who leaped at the sun
To give it my loving friends to keep!
Naught man could do have I left undone:
And you see my harvest, what I reap
This very day, now a year is run.

There's nobody on the house-tops now—
Just a palsied few at the windows set;
For the best of the sight is, all allow,
At the Shambles' Gate; or, better yet,
By the very scaffold's foot, I trow.

I go in the rain, and, more than needs,
A rope cuts both my wrists behind;
And I think, by the feel, my forehead bleeds,
For they fling, whoever has a mind,
Stones at me for my year's misdeeds.

Thus I entered, and thus I go!
In triumphs, people have dropped down dead.
"Paid by the world, what dost thou owe
Me?"—God might question; now, instead,
'Tis God shall repay: I am safer so.

THE DEATH OF THE FLOWERS

William Cullen Bryant, the famous poet and writer, was a close observer of nature. It is perhaps pleasanter to sing of the coming of the flowers and the radiant days of summer than of the falling leaves and dreary winter. But all seasons have their beauty, and the poet expresses it in his poem of late November. His most celebrated poem is Thanatopsis—a word made of two Greek words meaning "death" and "vision," a vision of death.

THE melancholy days are come, the saddest of the year,
Of wailing winds, and naked woods, and meadows brown and sere.
Heaped in the hollows of the grove, the autumn leaves lie dead;
They rustle to the eddying gust, and to the rabbit's tread;
The robin and the wren are flown, and from the shrubs the jay,
And from the wood-top calls the crow through all the gloomy day.

Where are the flowers, the fair young flowers, that lately sprang and stood
In brighter light and softer airs, a beauteous sisterhood?
Alas! they all are in their graves, the gentle race of flowers
Are lying in their lowly beds, with the fair and good of ours.
The rain is falling where they lie, but the cold November rain
Calls not from out the gloomy earth the lovely ones again.

The wind-flower and the violet, they perished long ago,
And the briar-rose and the orchis died amid the summer glow;
But on the hill the golden-rod, and the aster in the wood,
And the yellow sunflower by the brook, in autumn beauty stood,
Till fell the frost from the clear cold heaven, as falls the plague on men,
And the brightness of their smile was gone, from upland, glade, and glen.

And now, when comes the calm mild day, as still such days will come,
To call the squirrel and the bee from out their winter home;
When the sound of dropping nuts is heard, though all the trees are still,
And twinkle in the smoky light the waters of the rill,
The south wind searches for the flowers whose fragrance late he bore,
And sighs to finds them in the wood and by the stream no more.

And then I think of one who in her youthful beauty died,
The fair meek blossom that grew up and faded by my side.
In the cold moist earth we laid her, when the forest cast the leaf,
And we wept that one so lovely should have a life so brief:
Yet not unmeet it was that one like that young friend of ours,
So gentle and so beautiful, should perish with the flowers.

ON THE GRASSHOPPER AND CRICKET

What we have written on The Death of the Flowers is also true of this little poem by John Keats, one of the great English poets.

THE poetry of earth is never dead:
When all the birds are faint with the hot sun,
And hide in cooling trees, a voice will run
From hedge to hedge about the new-mown mead:

That is the Grasshopper's—he takes the lead
In summer luxury,—he has never done
With his delights, for when tired out with fun,
He rests at ease beneath some pleasant weed.

The poetry of earth is ceasing never:
On a lone winter evening, when the frost
Has wrought a silence, from the stove there shrills
The Cricket's song, in warmth increasing ever,
And seems to one in drowsiness half lost,
The Grasshopper's among the grassy hills.

LITTLE VERSES FOR VERY LITTLE PEOPLE

IF all the world were apple pie,
And all the sea were ink,
And all the trees were bread and cheese,
What should we have to drink?

HERE we go up, up, up,
And here we go down, down, downy;
And here we go backwards and forwards,
And here we go round, round, roundy.

MILLIONS of massive raindrops
Have fallen all around;
They have danced on the house-tops,
They have hidden in the ground.

They were liquid-like musicians
With anything for keys,
Beating tunes upon the windows,
Keeping time upon the trees.

BLOW, wind, blow! and go, mill, go!
That the miller may grind his corn;
That the baker may take it, and into rolls make it,
And send us some hot in the morn.

NOW, all of you, give heed unto
The tale I now relate,
About two girls and one small boy,
A cat, and a green gate.

Alack! Since I began to speak—
And what I say is true—
It's all gone out of my poor head,
And so, good-bye to you.

EVERY lady in this land
Has five nails upon each hand,
Twenty on her hands and feet.
All this is true, without deceit.

THERE was an old woman who had three sons,
Jerry and James and John;
Jerry was hung, James was drowned,
John was lost, and never was found;
And there was an end of her three sons,
Jerry and James and John!

"IS John Smith within?"
"Yes, that he is."
"Can he set a shoe?"
"Ay, marry, two,
Here a nail, there a nail,
Tick, tack, too."

I SAW a ship a-sailing
A-sailing on the sea;
And oh, it was all laden
With pretty things for thee!

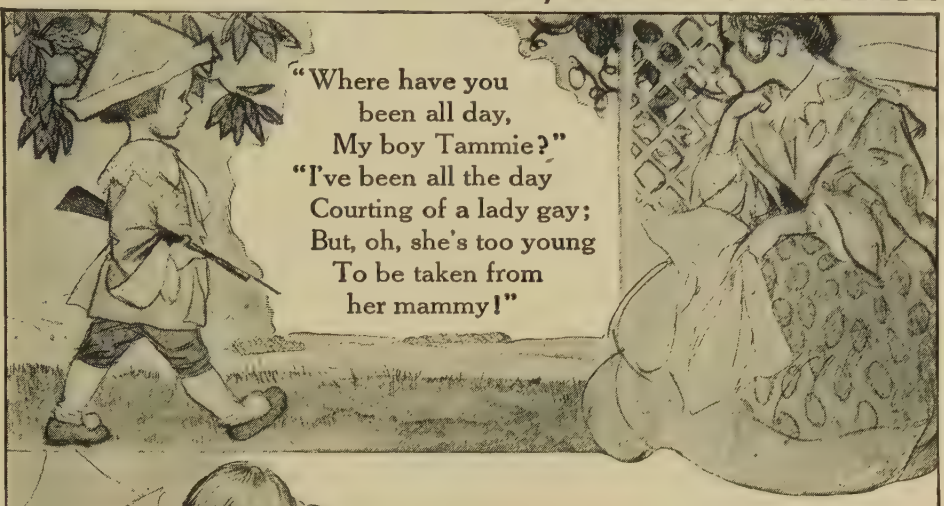
There were comfits in the cabin,
And apples in the hold;
The sails were made of silk,
And the masts were made of gold.

The four-and-twenty sailors
That stood between the decks,
Were four-and-twenty white mice,
With chains about their necks.

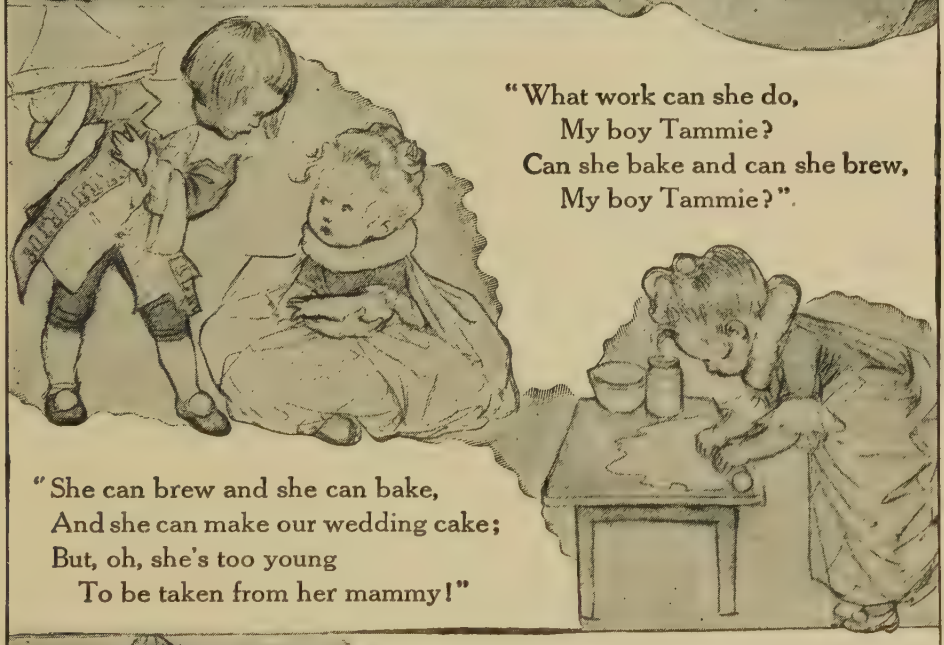
The captain was a duck,
With a packet on his back,
And when the ship began to move,
The captain said, "Quack, quack!"

HEY, my kitten, my kitten,
And hey, my kitten, my deary;
Such a sweet pet as this
Was neither fat nor weary.

WHERE HAVE YOU BEEN, MY BOY TAMMIE?



"Where have you
been all day,
My boy Tammie?"
"I've been all the day
Courting of a lady gay;
But, oh, she's too young
To be taken from
her mammy!"



"What work can she do,
My boy Tammie?
Can she bake and can she brew,
My boy Tammie?".

"She can brew and she can bake,
And she can make our wedding cake;
But, oh, she's too young
To be taken from her mammy!"

"What age may she be—
What age may she be,
My boy Tammie?"

"Twice two, twice seven,
Twice ten, twice eleven;
But, oh, she's too young
To be taken from her mammy!"

CAMEL-TRADING IN THE CAMEL COUNTRY OF AFRICA

Some camel-traders do business on a large scale, trading a thousand head at a time for a thousand others apparently as like those they brought as two peas.

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A scene in the Sahara Desert, showing a party of Bedouin Arabs moving to a new encampment.

HOW AFRICA HAS BEEN DIVIDED

CONTINUED FROM 6743

AFRICA is a huge, roughly shaped, compact mass of land three times as large as Europe, with a fifth of its surface covered with the largest desert in the world. The rest of it rises from the surrounding seas, by great terrace steps, to high plateaus in the centre. Long rivers, with courses of from one to three thousand miles, plunge down the terrace steps to join the sea; mountains guard the coast nearly everywhere, the snowy peaks of those on the east side overshadowing a most wonderful group of great lakes. Such is the face of Africa.

Africa's peoples and races are many. There are black men and brown men and white men—the last-named ever increasing in numbers. The black men and the races akin to them have been in Africa for an unknown length of time. So have the strange animals, which we know best from our zoölogical gardens. The early tribes and the animals lived in the great forests which still cover a large area of Africa, and on the shores of the wonderful rivers and lakes—forever absorbed in finding food and avoiding enemies. Among the animals was the great elephant, whose valuable tusk has helped to make history in Africa. In the forests were the rubber trees which have been another much-sought-for treasure.

The Arabs, or brown men, from the other side of the Red Sea, crossed over to Africa at various times through the centuries, and found their way down the coasts, over desert and plain, over rivers and mountains, all over the land. Their coming brought woe to the black men, for wherever they went the slave-gang and the chains went too.

The white men did not begin to come, except to the coasts within hail of Europe, till nearly the time of Columbus; and their coming also brought woe to the black men. They wanted ivory and rubber, and they were not particular how they got it. The sorrows of Africa can be summed up in these three words: slaves, ivory, rubber.

In the oldest maps, made by those who lived on the Mediterranean nearly two thousand years ago, all that is shown of Africa is the north and northwestern shores and the narrow land of Egypt in the northeast corner near the Isthmus of Suez. This neck of land, joining Africa to Asia, was, in the past, the great highway of the nations from east to west. Over it passed multitudes of people—armies for conquest, embassies from great kings, merchants who went to and fro between Egypt and the East, bridal and funeral processions. But neither the civilized old Egyptians nor the peoples of the north-

ern shores knew much of the great continent behind the strip on which they lived, for the great desert stood as a barrier in the way. The "ship of the desert," the long-enduring camel, was not used by the nomad tribes till the much later times of the Romans.

THE BRAVE MARINERS WHO FIRST DREW THE MAP OF AFRICA

We have to pass over many centuries, to the days of Prince Henry the Navigator and his brave Portuguese, of whom we read on page 5184, before much change is seen on the map of Africa. One of the results of their daring efforts, of their courage and perseverance, was that the discovery and shape of the outer rim of the great continent was made known to the world, and Africa as a whole could be sketched on the maps, together with the names of the settlements made gradually along the coasts by the Arab traders and the seafaring nations of Europe. The latter wanted way stations on their trade roads to the East.

But the interior of the great Dark Continent—what of that? For a long time little or nothing was known in Europe about the vast heart of Africa, and so the map-makers were driven to fill up the blank white space with drawings of fancy animals. Indeed, those of us who were at school only half a century ago found Africa a very easy map to draw and learn—there were so few names in the middle of it.

THE JOY OF THE MEN WHO DISCOVERED THE SECRETS OF DARKEST AFRICA

On page 465 we read how strong, good men in the middle of the nineteenth century followed each other, exploring the unknown parts of Africa, some with the view of helping to destroy the Arab slave trade and to teach the negroes, others to find out the sources of the rivers and to map out the country. Intense was their joy when the great lakes burst upon their astonished sight, and the snowy peaks came into view, and the thundering roar of mighty waterfalls on stupendous rivers deafened their ears as the boiling foam dashed high in air. These were some of the secrets hidden so long in the heart of Africa. Of all sad secrets that explorers have ever found, the saddest are the hard, beaten-down paths across Africa, trodden for centuries by the feet of gangs of miserable slaves torn from their homes, which were often lake-dwellings for safety. Sometimes the slaves would carry ivory to the coast; but for none of them was there ever any return.

Many of the travelers are held in remembrance by the names of places on the map; and a chain of graves marks the white man's progress across unknown Africa. Much of it, owing to the great heat and the swamps, and the insects that carry infection, is very unhealthful and trying, especially to Europeans.

HOW THE SLAVE TRADE DISAPPEARS AS AFRICA BECOMES BETTER KNOWN

But the map is still filling up; the slave trade is gradually being suppressed; and steps have been taken to put an end to the cruelties practiced on the natives who collect rubber.

Let us now turn to the relief map on page 6805, and look more closely at the great continent, with the countries of the widely differing people that live upon it. Its northern shore together with the coast of Southern Europe shuts in the great Mediterranean Sea, thought of by the ancients as the middle of the world. Its southern tip points to the South Pole; round the Gulf of Guinea it faces westward; and its eastern horn points to India.

Here, on this northeastern stretch, it is divided from Asia only by the Gulf of Aden and the Red Sea, which pilgrims cross on their way to Mecca, and through which steamers pass on their way from India to Europe by the short cut through the Suez Canal. At the western end the narrowness of the Strait of Gibraltar makes us think of the Moorish warriors pouring over the sea into Spain.

Look on your maps at the darker shaded areas which indicate highlands. You will see that they run very close to the sea. The coast plains in Africa —often fringed seaward by mangrove swamps—never stretch far from the sea, except on the lower courses of rivers. They form the lowest step in the terraces which lead up to the high interior plateaus.

Stretching across the northern corner you will find the Atlas range, divided from the rest of the continent on the south by the great Sahara Desert. The Atlas Mountains are as high as the Swiss mountains, have fine valleys and lovely scenery.

South Africa consists of an elevated

plain, or plateau, whose edges of high ground drop steeply to the coasts on east and west. This South African plateau to the north joins with the East African plateau. In the deep troughs of this plateau lie the enormous lakes, Tanganyika, Victoria Nyanza, Albert Edward. Frowning down on these great stretches of water, a number of volcanic peaks stand sentinel. And to the eastward rise the twin giants of Africa, Kilimanjaro (19,300 feet) and Kenya (17,000 feet).

The third division of the highland division of Africa is formed by the mountains of Abyssinia, a rugged mass nowhere lower than 5,000 feet, and ascending to heights of 15,000 and 16,000 feet. Here is found Lake Tsana.

AFRICA WITH THE NAMES OF EUROPEAN POWERS ON THE LANDS THEY CONTROL

Little of Africa is in control of the natives. The kingdoms of Abyssinia and Egypt and the little negro republic of Liberia are the only independent states. France controls the largest portion, though much of it is desert. Great Britain, Belgium, Spain, Portugal and Italy all control large divisions. The former German territories have been divided. German East Africa, now called Tanganyika Territory, is governed by Great Britain, and German Southwest Africa by the Union of Africa. France governs Cameroon, or, as the Germans spelled it, Kamerun. Togoland is divided between Great Britain and France.

There remain the plains of north and west Africa, which are bordered and crossed by bands of higher ground. This division includes the great desert of the Sahara. Both on the east and west the highlands are continued as ridges run-

ning along the coasts. Thus the Abyssinian mountains stretch along the Red Sea coast, and in the west the most mountainous district lies inland from the Gulf of Guinea.

THE NILE, THAT FLOWS IN EGYPT LIKE A MIGHTY THOUGHT THREADING A DREAM

There is at least one immense river to every side of Africa. On the north, draining to the Mediterranean for over three thousand miles, is the Nile, one of the most interesting and wonderful rivers in the world, "flowing through Egypt like some grave, mighty thought threading a dream." The first cataract, or rapid, on the Nile is hundreds of miles from the sea.

Into the Indian Ocean on the east side pours the great Zambezi River, opposite the island of Madagascar. Navigation is very difficult near its mouth. Its tributary, the Shire, drains Lake Nyasa, and is of great use in passing through the country. The magnificent Victoria Falls, high upon the Zambezi itself, are twice as high as Niagara. The great river suddenly dashes over a cliff about 330 feet high, with a deafening roar, while the spray is shot high in the air. Truly it is one of the wonders of the world!

From the high table-land beyond the group of great lakes rises the mighty Congo, nearly three thousand miles long; it circles away to the western side of the continent to empty its immense volume of gathered waters into the Atlantic. The explorer Stanley marched for five months through unbroken forests in its basin, and his name is commemorated in the Stanley Falls. There are over six thousand miles of navigable waterway in the Congo and its tributaries, all of which enter it above the deep gorge through which it reaches the sea by many falls. Some day, no doubt, the Congo will furnish water power for manufacturing.

THE THREE GREAT RIVERS THAT WATER THE HEART OF AFRICA

The Niger, with its tributary, the Benue, draining into the Gulf of Guinea, is also very important in opening up a way to some of the richest land in Africa. It touches the Sahara on the south, near Timbuctu, the central meeting-place of the caravan traffic.

The Zambezi, Congo and Niger may be called rivers of the future, so vast are the resources to be opened up in their basins. The Nile has a great past as well as great prospects. For countless centuries it was worshiped as a god, so mysterious and wonderful are the blessings it brings to the country it has made. The mystery has disappeared since the sources of the Nile were discovered. No longer are beautiful thanksgiving hymns sung to the Nile, nor offerings cast into its placid bosom; but it steadily goes on making and blessing Egypt. "Egypt is the gift of the Nile."

THE TORRENTS OF RAIN THAT CARRY THE MUD OF ABYSSINIA INTO EGYPT

When the tributaries of the Blue Nile and Atbara were traced to the highlands of Abyssinia, the mystery of the rise of the Nile and its fertilizing mud was solved. The torrents of tropical rain tear down the earth from the gorges and the cliffs, and the muddy water rushes down through Nubia over the chain of cataracts to the almost level course from Assuan to the sea. It is at Assuan that the great dam across the river has been made to regulate the supply of water. It means famine and bitter sorrow to the people of Egypt when the Nile rises too little or too much, for then the fine crops of cotton, corn, flax, sugar and hemp fail, and there is famine in the land. But the water stored in the great reservoirs not only irrigates lands that up till now were dry and barren, but supplies enough for use in dry seasons.

At Khartum the Blue Nile joins the White Nile, the main stream from the British district of Uganda, where it drains the Victoria and Albert Nyanza—the word Nyanza means "lake." You will find the wonderful story of Egypt on page 807, and the account of the British big African empire on page 3047. Here we are going to read about the rest of Africa, and we shall begin with the great French African empire.

ALGERIA, MOROCCO AND TUNISIA IN NORTH AFRICA

Northwest Africa consists of Algeria, Morocco and Tunisia. The most easterly country is Tunisia, with a climate made unusually equable by the Mediterranean on the north and east. The story of Tunisia goes back almost to the dawn of our knowledge of the world. It has dolmens like those of Brittany and England, showing that before historical records begin, it must have been the home of a primitive race of sun-worshipers. For centuries it was called Libya. About eight hundred

DAILY LIFE OF THE PEOPLE OF CAIRO

Cairo has a large European population. Its picturesque part is the native quarter. This is truly Oriental, and the latticework of the houses shows Saracen art at its best. The streets are thronged, and fruit-dealers do a good business.

The streets of Cairo are narrow and winding, and the buildings present a never ending variety of style. A traveler in the native quarter might think himself in some fairyland of The Arabian Nights. The lemonade-seller is a familiar sight.

An old Arab writer said that "he who hath not seen Cairo hath not seen the world; its soil is gold; its Nile is a wonder; its houses are palaces; and its air is soft, its odor surpassing that of aloes-wood, and cheering the heart." Perhaps none of its people has done so much to beautify the native city as the craftsman who works in ivory and wood and produces the famous latticework. He uses his left foot as a third hand, and is known in the city as the "three-handed man."

The photographs on these pages are by Underwood & Underwood and Messrs. Valentine.

years before Christ some of the Canaanites founded colonies along the Mediterranean coasts. Some of them landed in what is now Tunisia, and there built the great city of Carthage, famed in ancient history as mistress of the sea and the rival of Rome. In Africa these Canaanites were called Phœnicians.

Tunisia was so favorably situated that all nations wanted it. The real object of the Punic Wars was its conquest, and when Rome and Carthage had fought three great wars, Carthage was destroyed. For three hundred years Tunisia had peace. Carthage was rebuilt and became one of the most magnificent cities in the Roman Empire. Then against the Empire burst the great flood of barbarians out of the east and north. The Vandals swept over Tunisia. Following them came the Arabs, who utterly destroyed Carthage in the middle of the seventh century. For the next thirteen hundred years or more the site of the capital was marked only by a few ruins and by two or three small hamlets.

THE TERROR OF THE BARBARY PIRATES

From Tunisia the Arabs swept all along the coast and across the narrow Straits of Gibraltar into Spain. The story of their rule there, and of their gradual expulsion, is told in the story of Spain on page 5039. Then Spain, united, and enriched by her South American gold-mines, began to carry arms across the sea against the hated Moslems. In the sixteenth century pirates established themselves in the harbors of the coast; and Charles V made many efforts only partially successful to dislodge them. These pirates, or corsairs, were men of extraordinary daring, and by attacking merchant ships and wealthy towns they secured great riches.

Many and grievous are the stories of the sufferings of their prisoners. They made slaves of them if large ransoms were not paid, and soon the chains, the increasing toil and the hardships brought on their early death. Eventually the Turks were drawn into the contest and succeeded in obtaining for a while the chief power in North Africa. Many European states paid large sums to buy freedom from the attacks of the corsairs who carried on their evil ways till less than one hundred years ago.

The United States sent a fleet against them. The English and the Dutch did likewise; but it was not until 1830 that the French took Algiers and destroyed forever the nests of the pirates. They set the captives free and founded, after many difficulties, the French Empire in Africa, which now spreads over the Central and Western Sudan, over the basin of the Niger, and along the western coast of the great continent. "France in Africa" is half as large as the United States.

THE SAHARA HAS BEEN CROSSED BY THE WHITE MAN, BUT NOT CONQUERED

In these countries of North Africa, Algeria, Morocco and Tunisia, the deep blue of the sky is hardly ever broken. Between them and the rest of Africa is the great Sahara Desert. Over parts of it caravans of camels and mules crawl through unbroken seas of sand toward some distant oasis. Until a few years ago the Great Desert—and indeed the whole of North Africa—was a most impenetrable region. A journey into it was undertaken only for an adventure. To-day the caravan routes—some of them so uncertain that the traveler had to guide by compass or by the stars—have been transformed into highways, and motor cars cross them all. The whole desert has been crossed by automobile, yet its ancient spell is not broken. So vast is the Sahara that the coming of an occasional motor car and the building of hotels on the oases for travelers have as yet made scarcely more than a ripple in its solitude.

The Atlas chain runs through French North Africa from the southwest to the northeast. In Morocco, except for its extremity, the range is farther from the coast than in Algeria and Tunis, and a vast stretch of plains and plateaus lies toward the ocean. Morocco was, until recent years, the least known and most difficult country to visit. Once it was the centre of a great civilization, as its wonderful architecture shows. Fez, the Holy City of the West, was the capital. In the Middle Ages it declined, and its commerce was principally traffic in slaves. This slave traffic was not brought to an end until the capture of Algiers in 1830. Even then, Morocco remained a forbidden land till a few years ago. In 1912 the country was recognized as a protectorate of France. Since then, though creed, traditions and liberties have been

THE PEOPLE OF TROPICAL AFRICA

In Uganda, now a British protectorate, missionaries have done splendid work. It was there that Bishop Hannington sealed his testimony with his blood. Here is a typical village market, and, as we can see, the natives are happy and prosperous, very different from some other African races.

This is a village in Portuguese East Africa, which lies between the Indian Ocean and the British possessions in South Africa.

Much rubber is obtained from Portuguese East Africa, and here we see a rubber plantation near Beira. Rubber is a gum that comes from trees.

Here are two children of the Congo. The population of this district, which belongs to Belgium, is about twenty millions, including different races.

Here is a village on Prince's Island, in the Congo River opposite Boma, the seat of the Government and the home of the Belgian Governor-General.

respected, great improvements have been made. Railways, roads and ports have at last opened Morocco to the traveler.

ALGERIA, AND THE DIVISIONS OF ITS SURFACE

From the blue Mediterranean looking south, one perceives lofty blue mountains —as if the water were reflected in little lakes among the clouds. This is the great Atlas range, which in Algeria runs very close to the coast. The narrow coastal plain is called the Tell. The cities of Oran, Algiers, Bougie, Philippeville and Bona, and the French gardens of the Plains of the Tell are set like gems along the coast. Farther inland the country is broken and abrupt, rising into mountains divided by deep valleys, or into vast plateaus. Here are the Atlas Mountains, and among them seasons are sharply defined. Beyond the southern spurs of this belt lies the wonderful desert. The Algerian part is richly furnished with oases with palm groves and artesian wells. Brown is the dominating color of the country and all that is in it—sand, Arabic mud-houses and mountains. Inland from Algiers, and eastward, lies the country of the Kabyles, who are direct descendants of the Berbers, the aborigines of North Africa. Through all the many invasions of this part, the Kabyle country has remained apart and secure in its narrow valley dominated by mountains.

Tunisia is a veritable garden. It is essentially an agricultural country; in the north wheat-growing and cattle-raising are the principal occupations, and in the Sahel districts, which are rich fertile plains on the east coast, and around Sfax flourish olive plantations. Tunis, the capital of the regency, is built on the site of the first Carthage. It is not modernized, and with its white buildings and quaint Arabic quarters and native *souks,* or bazaars, makes a perfect Oriental picture. Kairouan is the sacred city of North Africa. There are sixty mosques in this town, including the Great Mosque with white marble pavements and eight hundred columns of many-hued marble and granite.

It often surprises people to discover that North Africa is rich in Roman ruins. Indeed, its wealth is greater than present-day Rome, and there are many ruins from earlier times, going back to the Phœnicians. Carthage, Volubilis, Cherchell, Tipaza and Timgad are treasuries of interest for the archæologist as well as for the visitor.

Naturally, because of the many invasions, there is a great mixture in the population, but still the ancient stock, the Berbers, prevails. Next come the Jews, and then the negroes.

FRENCH EQUATORIAL AFRICA AND FRENCH WEST AFRICA

The exhaustion of France in the World War and the French fear of becoming dependent on foreign countries for food aroused a lively interest among the people in the resources of the French colonies. To complete our survey of the great North African empire of France, we must consider French Equatorial Africa and French West Africa. You will find them on your map.

French West Africa includes Senegal, French Guinea, Ivory Coast, Dahomey, the valleys of the Upper Senegal and Niger, the district of Mauretania, and the colony of Upper Volta. These, like the British West African colonies, have been penetrated from bases on the coast, for purposes of trade. When the region was reorganized for its government in 1920, it was decided to improve lines of communication as a first step in developing its resources.

French Equatorial Africa, with an area of 718,000 square miles, includes Gabon, Middle Congo and the Lake Chad district. Where it touches on the Sahara Desert the northern boundary is undefined. This region is very varied as to surface. The Middle Congo and Gabon include partly the region of coastal mountains and partly the central basin of the Congo. The Lake Chad district is plateau country.

Communication in a land largely covered with dense forest is chiefly by waterway. Unfortunately the navigation of nearly all the rivers is interrupted by rapids. There are to-day only about a hundred miles of railway, but the French Government has further plans. Letters are carried by monthly or bi-monthly messengers. Agriculture and industry are carried on in a small way. Methods are primitive still; the ground is never manured, and the hoe used for the plow. The population is scanty, for sleeping-sickness is bad, and slave raids formerly carried off great numbers. There are a few plantations for cocoa, coffee and va-

nilla, and millet is a staple food of the natives. Elephants are still numerous throughout the great equatorial forest, and wild ostriches may be found on the edge of the Sahara. Stock-raising on a large scale is not yet possible because of the tsetse fly.

Brazzaville on Stanley Pool is the capital. Libreville and Port Gentil are the chief ports.

The large pear-shaped island on the southeast coast of Africa called Madagascar has belonged to France since 1896. In settling and colonizing that country much wise work was done by General Gallieni. He afterward wrote a manual on Madagascar, which William II of Germany handed to his colonial ministers, remarking: "Read and imitate."

Now we shall start on a rapid survey of the rest of Africa.

Turkey in Africa, once very large, does not exist at all, as Italy has taken Tripoli, Tunis is under French protection, and the Sultan of Egypt is now independent of the Sultan of Turkey.

If we look at the map on page 6805, or make a map of Africa, marking the chief divisions, and set in each division little flags of the countries who own them, we shall gain a good idea of what is meant by "the scramble for Africa." Except in a few cases, as we have seen, the uncivilized black races and tribes have been unable to hold their country either against Arabs or white men. So when particulars began to be known about the vast interior, at a time when most European nations were desiring room to expand across the seas, they turned to "unoccupied" Africa, each seizing the parts that were most easy to annex. The flags make a gay fringe right round the coast of the great continent.

THE FLAGS OF THE NATIONS THAT FLY ALL ROUND THE AFRICAN COASTS

Let us start from Egypt, with its crescents and stars. Libya, formerly called Tripoli, flies the Italian flag; Tunis and Algeria show French flags, and stretch far south beyond the mountains into the Sahara. Some day the French hope to push a railway across the desert to their possessions on the Niger. Morocco has its own red flag, and that of Spain signals from Ceuta, the Southern Pillar of Hercules, to the Union Jack that flies on the Rock of Gibraltar.

Spain also owns the Sahara coast from Morocco to Cape Blanco, where the enormous French West African possessions begin. The independent striped flag of Liberia, the state of freed slaves, waves on the coast of Guinea, neighbored by numbers of European flags, all marking the various divisions now owned by their countries. Then, on the Congo, we have French flags again marking out the territory reaching up to Lake Chad, that curious lake sometimes as large as New Jersey and sometimes a swamp.

THE CONGO STATE, THAT IS NOW UNDER THE RULE OF BELGIUM

The Congo State, now under the rule of the Belgians, has only enough room on the coast to plant its flag, though it expands large and square in the interior. Angola is Portuguese; so is a long strip, Mozambique, watered by the Zambezi on the east coast, opposite Madagascar, which from end to end is French. South of Angola lies what was German Southwest Africa until the World War. It is now governed by the Union of South Africa. The southern tip of the continent shows the British flag. German East Africa, with the three beautiful lakes of Nyasa, Tanganyika, and Victoria on its borders, is now called Tanganyika Territory, and is governed by the British. Kenya was formerly called British East Africa.

From Zanzibar, celebrated for its cloves, the caravans for the interior fit out; and many are the stirring adventures with slave-ships on this part of the coast. Italian flags wave on the horn of Africa, reaching up to the Gulf of Aden, where British Somaliland and French Somaliland separate Italian Somaliland from the Italian colony of Eritrea, which cuts off Abyssinia from the Red Sea. During the World War Germany's possessions in Africa were taken from her by the nations allied against her. The Peace Conference decided that none should be returned, but that they should be managed by other countries, for the good of the people. These territories are said to be governed under a mandate. The changes are all shown on the map.

Railways have been begun by all the powers that now claim the right to govern Africa, and many miles of these railways have been built. This is a good thing for the natives, for enterprise like this strikes at the very root of the slave trade and the cruelties connected with the

gathering of ivory and rubber; for rapid travel opens up dark places and draws together the great and varied interests of the huge continent. And it is this lighting-up and linking-up that alone will make it possible for Europeans to carry out the obligations they took upon themselves when they hoisted their flags over vast numbers of uncivilized natives in Africa. The trade of this vast country on either side of the railway is in its infancy, but great prospects are foreshadowed. These prospects can be made realities only by the people of the white races, and in doing so the temptation to oppress the weak and ignorant natives always exists. But this temptation must be resisted. If the wealth which lies in this great region is to be of real benefit to the world, part of it, at least, must in justice be spent in providing for the natives the education suited to their needs, and in raising them to a higher level of civilization, and bringing the blessings of peace and justice.

THE HUGE AREA OF THE BELGIAN CONGO

Leaving the French empire of Equatorial Africa, we find upon our maps a huge area sprawling over the Equator which reaches down to Rhodesia on the southeast and comes out to a point on the Atlantic Ocean. This is the Belgian Congo, eighty-eight times as large as the little country which owns it. It contains about six thousand white men and twelve million blacks. Across it Stanley made his way in two epic expeditions, and Livingstone there worked. Before Stanley crossed Equatorial Africa, what is now the Congo was a blank spot on the map, where no white man had penetrated. When Stanley's articles describing the Congo appeared in English papers, King Leopold of Belgium perceived a great chance for the trade development of his own little country. He sent Stanley back to the Congo in 1879 to organize a string of stations from the ocean up to what is now Stanleyville. Six years later the Congo Free State was founded, with Leopold as its recognized sovereign. Its founders wanted to suppress the slave trade and open up the territory into factories and markets. In 1904 began a fight about cruelties that were said to have been practiced by the Europeans upon the natives. After several years' lengthy investigation, however, the Congo was given to Belgium in 1908.

It is possible that the Congo may become one of the great centres of world-supply. The surface of its vast area has as yet been scarcely scraped, though unfortunately the wild rubber of its forests has already been exhausted because of nearly ruthless harvesting. But the Belgian Government has laid out experimental farms for cotton and coffee, and these are now flourishing. The chief product of the soil is the fruit of the palm tree. In 1911 a big plant of the Huileries du Congo Belge (oil works of the Belgian Congo) was installed. It was an answer to the growing cry for palm-oil as a substitute for animal fat in soap-making. Now when the kernels of the fruit are collected they are shipped to England (before the World War to Germany), and there crushed, and oil is extracted which may be used for soap, salad dressing and margarine.

THE OIL-PALM IS THE STAFF OF LIFE IN WEST AFRICA

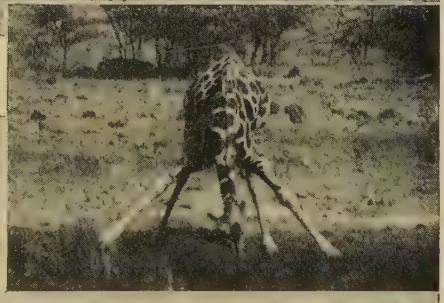
In Belgian Congo, as in most of West Africa, the oil-palm may be called the staff of life. It is food, drink and shelter. Out of the trunk the native gets his wine, and from the fruit, oil. The leaves provide a roof for the natives' houses; the fibre can be used for thin mats, baskets and nets; and the wood for building.

The Congo has, besides, valuable mines. In the Katanga region nearly 30,000 tons of copper were mined in 1917. Its greatest need for development is transport, for practically every ton of merchandise now has to be moved by man power through the greater part of its journey. The Lualaba and the Congo rivers make an almost endless chain of water communication, whereon the river boats are driven by wood-fuel collected at night from wood-stations on the banks. There is but little railway as yet, partly because of the thickness of the forests. The campaigns against the Germans proved that it was possible to use airplanes, and the Congo was the first of the Central African countries to put in a regular service of planes for purposes of trade.

At Stanleyville one feels in the heart of Equatorial Africa. Less than fifty miles north begins the wild and primitive country where elephants abound. The town is therefore a centre of ivory trading. No sooner is the traveler on the Congo than he falls under the spell of its mighty flood, serene, majestic, well-

NO TWO ARE MARKED ALIKE

Common Zebra and Wildebeeste on the Ol Garari River in the Southern Game Reserve, British East Africa.



It is hard for a giraffe to straddle down to the surface of water, and accordingly he never drinks at a deep-set pool. He has no vocal cords and uses some sort of "giraffe deaf and dumb" language.

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nigh overwhelming. Its shores are brilliant with vegetation, and behind them stretch the wilds of the equatorial forest in whose gloomy depths Stanley struggled forward. Though the river is six miles wide in parts, it is frequently not more than six feet deep, and its navigation is consequently difficult. There are, moreover, frequent sand bars, caused by the rapid currents everywhere.

Little Belgium has very difficult problems to cope with in the mighty tropical Congo colony from those in her own little northern land. In the development of the Congo territory lies much of the hope of her future, and her kings of finance are learning by hard experience to think in big terms and to get a world-view.

PORTUGUESE COLONIES IN AFRICA

Besides a strip on the Guinea coast, to the south of the Belgian Congo we find Portugal's Western African colony, Angola. Angola has a coast line of 1,000 miles but very few good harbors, the best being São Paulo de Loanda, Lobito, Benguela and Mossamedes. Here the rivers are short, and dry up in the hot season. The coastal plain extends inland for about a hundred miles, then gradual terraces lead up to the interior plateau. Trade is mostly with Portugal, and the chief articles exported are coffee, rubber, ivory, wax and fish. The land is held mostly in very large plantations by the Portuguese and the condition of the farm laborer is not good.

Though the governor appointed by the home government is in supreme control, the greater part of Angola is under native chiefs who rule the 3,800,000 Bantu-negroes. The Portuguese explorer Diogo Cam visited the estuary of the Congo at the end of the fifteenth century, and established Portuguese rule on the coast. Very little was done to extend this, and the Dutch almost took their place. By treaties, however, Portugal succeeded in establishing rights to the large colony she now has.

Mozambique, formerly Portuguese East Africa, is to-day the most important of Portugal's overseas possessions. Vasco da Gama discovered it in 1497. Eight years later a Portuguese captain estab lished a fort at the mouth of the Sofala, where he found the Arabs had become the chief residents. Varying fortunes marked the life of the settlers in the years that followed, till at last Mozambique became a part of that government of Portugal known as the East Coast of Africa. The Arabs in the country and Mohammedan adventurers in galleys on the shores cost the settlements all their peace. Dutch pirates also began to appear in East African waters in the early part of the seventeenth century, carrying their daring to the point of laying siege to the Mozambique fortress itself.

With the rapid colonization of Africa by European nations at the end of the nineteenth century, the boundaries of Mozambique were settled by agreement with Germany and Great Britain. Slavery was abolished in 1878. The chief port and capital, Lorenzo Marques, and the port of Beira are outlets for the Transvaal and Rhodesia. Its products are tropical—rubber, ivory, wax, minerals. The colony is under a Governor-General.

THE INDEPENDENT COUNTRY OF ABYSSINIA

We must not, before leaving Africa, forget the independent country of Abyssinia, known chiefly to us as being the source of the fertility of Egypt. It has an area of 432,600 square miles and a population that is variously given as being from 3,500,000 to 8,000,000. The northern half is part of the ancient Ethiopia, and the people still call themselves Ethiopians. "Abyssinia" comes from an Arabic word meaning "mixture" and refers to the different tribes which make up the population. The people practice an ancient and corrupt form of Christianity, introduced into the country in the fourth century. They are ruled by an emperor or "negus" who is a sort of feudal monarch.

The rise of the Mohammedan power in the seventh century cut Abyssinia off from the outside world and left its civilization in a primitive state. By the same cause Abyssinia was cut off from the coast. Portugal gave help in the sixteenth century against Turkey, but when the Jesuit priests tried to reform the religion all foreigners were expelled from the country, and laws were made which allowed no stranger who entered to depart. In the nineteenth century the bar was lifted for a while, and after wars with Italy and England the independence of Abyssinia was recognized.

THE NEXT STORY OF ALL COUNTRIES IS ON PAGE 6857.

Young sailors learning to tie knots at a naval training station.

SHIPS AND SAILORS OF OUR NAVY

CONTINUED FROM 6752

IN another part of our book we have told you some of the stories of the United States Navy while it was small and weak. There are many other stories of bravery and skill which we did not tell, but we cannot find space for them all. They would entirely fill our book. Now we shall talk a little about the navy to-day, when it is one of the largest and strongest in the world.

The ships in which Perry, Decatur, Hull and the rest fought were sailing vessels built of wood. They carried a great many guns, more than the largest battleships do now, but these guns were small, did not carry far, and were not very accurate. One of the smaller battleships of to-day could destroy any number of the best wooden ships of the War of 1812. They could hardly get near enough to fire a shot, and if by chance they did, they could not do much harm.

You have read of the battle between the Merrimac and the Monitor in the Book of the United States. This was the first battle of iron ships in the world, and soon all the nations were building them. From this small beginning have come all the mighty battleships which cost so much money and can do so much harm.

Though the United States had a large fleet during the Civil War, after the war was ended the people wanted peace so much that the navy was neglected. It was thought that no foreign power would interfere with the United States, and the old wooden ships were allowed to rot. It had been found that vessels like the Monitor were not safe in a storm, and few of them were built. For a time the United States did not have a single armored ship.

Men began to see that the United States would be helpless if attacked, and in 1883 Congress ordered four armored ships to be built. Four more were ordered in 1885, and each year after this several more were ordered. In 1890 Congress ordered three large battleships. Others were built later, and the work of the navy in the Spanish-American War convinced the country that we must have many more ships.

There are many kinds of ships in a first-class navy, used for different purposes. We often speak of the great gray battleships as if they were all. These battleships are very important, and they cost more than all the others together, but in any navy they are few, compared with the whole number. Besides the battleships there are usually cruisers of several kinds, gunboats,

destroyers, submarines and submarine-chasers, flying boats, oilers, supply ships, hospital ships, tugs and others.

Let us look at the United States Navy. First to be mentioned are the battleships. There were forty of these at the beginning of 1918, but in 1921, following a treaty between the United States, the British Empire, France, Japan and Italy, this number was reduced to eighteen. The newest ones are the most powerful, for they carry either more guns or else heavier ones. Such ships are several hundred feet long, and have very powerful engines which give all the newer ships a speed of twenty knots, or more. The ship is protected above the water-line by heavy plates of hardened steel from twelve to eighteen inches thick. They have from eight to twelve big guns and a large number of smaller ones.

One of these great ships costs at least $15,000,000, and some of them cost much more. It costs thousands of dollars to fire its big guns. It carries a crew of over one thousand men. Ships differ so much that we cannot give exact figures. The battleships are named for the states of the Union, as Wyoming, New York and Oklahoma.

Next come the cruisers. There are several kinds of them. Generally we can say that a cruiser has lighter armor and fewer guns than a battleship, but greater speed. The idea is to have a ship which can get to the point of danger quickly and will still have power to damage the enemy. Some cruisers are named for states, but generally they are called for cities, as Richmond, Detroit and Concord.

THE SWIFT DESTROYERS WHICH PATROL THE SEAS

One of the most important ships is called the destroyer, and got the name in a peculiar way. Years ago, when the torpedo first came into common use, small ships were built which fired torpedoes from the deck. Larger ships were built to fight the torpedo boats and were called torpedo-boat destroyers. They carried torpedo tubes and rapid-fire guns also. They were so much superior to the torpedo boats that few of the latter are built now, but every navy has many destroyers.

The destroyers have no armor, but do have great speed. Some of them can make over thirty knots. They are armed with three- or four-inch guns, and carry torpedo tubes. They run errands, protect merchant vessels and look for mines and submarines. It is possible for their torpedoes to sink a battleship. Their guns will smash a submarine, and if it submerges, they will drop depth bombs into the water where it went down, or where they think it has gone. The depth bomb is a steel case containing explosives which can be set to explode at any depth desired. As you know, the pressure of water increases with the depth, and since experiments have shown the difference the bomb is set to explode at a certain pressure. This bomb may destroy a submarine even if it explodes some distance from it. The United States destroyers are named for the naval heroes, as Farragut, Hull and MacDonough.

We have already told you about torpedo boats. Now we come to the patrol boats, or submarine-chasers. They are really scout boats, and can do good work against the old-fashioned submarines. The newer submarines carry guns on their decks which are sometimes heavier than those of the patrol boat, however, and could easily destroy it. But the patrol boats can still be of much service.

We have told of the submarines and of the flying boats in other stories in our book, and cannot tell more of them here.

A battleship uses a great deal of oil as fuel, but does not have much room to carry it. So we have oilers which carry many gallons and meet the battleships at some place agreed upon, or else stay with the fleet except when a fight is expected. Formerly ships burned coal as fuel, and were attended by colliers, which carried coal to the battleships, but now our battleships all burn oil, those formerly burning coal having been changed to oil-burners.

There is not much room for wounded on a warship of any sort, and they cannot be looked after very well. So hospital ships are fitted up to take care of the wounded from the fleet. Some of them have every convenience that a good hospital would have.

Besides these which we have mentioned, many vessels are needed in a well-equipped navy. It must have tugs, supply ships, and often a vessel is fitted up as a workshop, where repairs too difficult to be made on a fighting ship may be done. One or more of these will go with every fleet.

ONE OF THE MOST POWERFUL BATTLESHIPS

Photo, Brown Bros.

The United States ship Arizona carries twelve 14-inch guns, and fourteen 5-inch as a secondary battery, besides two torpedo tubes. The shells of the great guns weigh 1,400 pounds. The horse power is 32,000 and it was designed to make twenty-one knots. The latest battleships of the Navy carry 16-inch guns, which will throw a shell weighing 2,100 pounds a distance of twenty-two miles. There are six other vessels in the United States Navy of about the same power as the Arizona. We show some pictures of a sister ship, the Pennsylvania, including the heavy guns, which are so formidable.

When the United States entered the World War a large number of ships of all sorts was sent to Europe and did good service there.

Now who are the people on the battleship? Let us first take the officers. In our story of Annapolis we told you that the young graduate was appointed an ensign. This corresponds to the second lieutenant in the army. Next in rank is junior lieutenant, equal to first lieutenant in the army, while lieutenant corresponds to captain. Next comes lieutenant-commander, corresponding to major, and commander, corresponding to lieutenant-colonel in the army. The captain in the navy is equivalent to the colonel in the army. Above the captain the ranks are rear-admiral, vice-admiral, admiral, and admiral of the navy. There are many warrant officers and petty officers which correspond in a general way to sergeants and corporals in the army, though their positions are more important in some ways and they get more pay.

A sailor enlisting in the navy for the first time must be between seventeen and thirty years of age, and must be able to read and write English. He may enlist as a seaman or for work at the particular trade he knows. A battleship is a great mass of complicated machinery, and blacksmiths, carpenters, machinists, shipwrights, steamfitters, plumbers, electricians, and the like are needed. Yeomen are the clerks. Hospital attendants, druggists, cooks, and so on, are also needed.

When a young man enlists he is usually sent to a training station for a few weeks or months. Here he learns the drill, the great lessons of obedience, neatness and promptness, and begins to learn his duties. Many things on a ship are not done the same way as on land. The sailors sleep in hammocks or bunks which are rolled up out of the way in daytime. The tables from which they eat are often swung up to the ceiling to get them out of the way when not in use. Every inch of space is precious, and the same room must be used for several things. Each sailor has a box with a lock in which he may keep any small thing he prizes. His clothes are kept in a strong bag, and every article must be folded and rolled in a particular way. An officer frequently inspects the bags.

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The food served on the ships is always good, but on holidays and special occasions extra attention is given to the bill of fare. Young men almost always improve in health while in the navy. Here you see the cooks preparing for Thanksgiving. A great quantity of everything is required to feed several hundred hungry men.

Enlistment in the navy gives many young men a better education than they would get outside. Classes are held on shipboard in time of peace, and, besides, a young man may learn a trade which will enable him to make a good living when his term of enlistment has expired. In addition, he sees the world, gets good food and clothing, and learns habits which will be of use to him in after life.

THE NEXT STORY OF FAMILIAR THINGS IS ON PAGE 6965.

A LATTICE MAST ON A BATTLESHIP

The battleships of the United States Navy have these peculiar masts, made of rods of steel firmly bound together. Such masts are seen upon the battleships of no other nation. Ladders inside enable the sailors to climb to the lookout or to repair the wireless and do many other things. Note the two enormous searchlights near the bottom of the picture. They can make the spot upon which they are turned as bright as day.

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DAILY ROUTINE ON A GREAT BATTLESHIP

Sailors do not often come very close to the enemy, for most naval battles are fought at a distance of several miles. However, it may be necessary to land a party sometimes for various reasons. The sailors therefore are drilled in the manual of arms exactly as soldiers are drilled. Here we see a part of the crew of a great battleship being drilled on deck by the officer in the background.

Everything about a battleship must be kept scrupulously clean, since so many men must live in a small space. Even the decks are washed and scrubbed every day until they shine. These sailors are making the deck so clean that one could eat from it. The light and the wet deck make a very attractive picture.

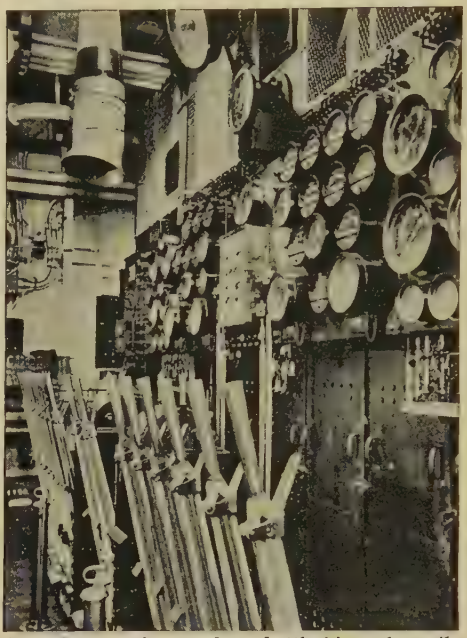
Photos, copyright, Underwood & Underwood.

ONE OF THE GREYHOUNDS OF THE SEA

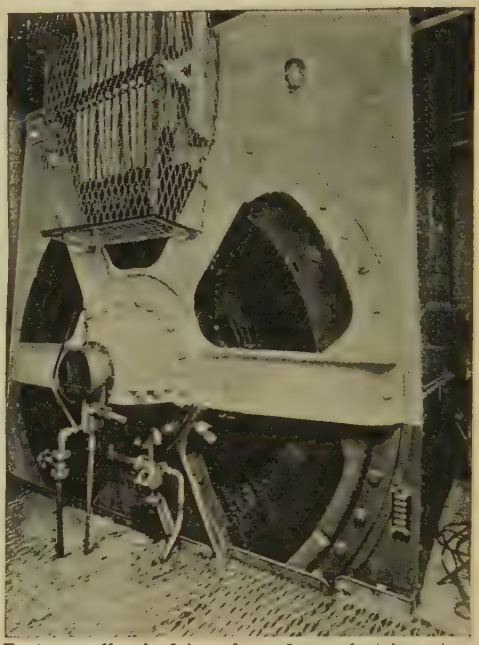
Soon after the self-propelling torpedo was invented, many torpedo boats were built, but very soon larger boats, called torpedo-boat destroyers, took their places. This is one of many United States destroyers. It has a speed of nearly 30 knots, and carries four torpedo tubes and four 4-inch guns. Such boats are much dreaded by enemy submarines, both because of their speed and accurate gun-fire.

Here we see sailors working on a torpedo, which is fired from the torpedo tube to the right. The explosive is in the nose of the torpedo, which does not show. The body of the torpedo contains the chamber for compressed air and the machinery which moves the propeller and guides it. The torpedo is shot over the side by compressed air, and then moves by its own power. Photo, Brown Bros.

THE WONDERS OF A GREAT SHIP



Control-room of a modern battleship, where the electric motors propelling the ships are controlled.

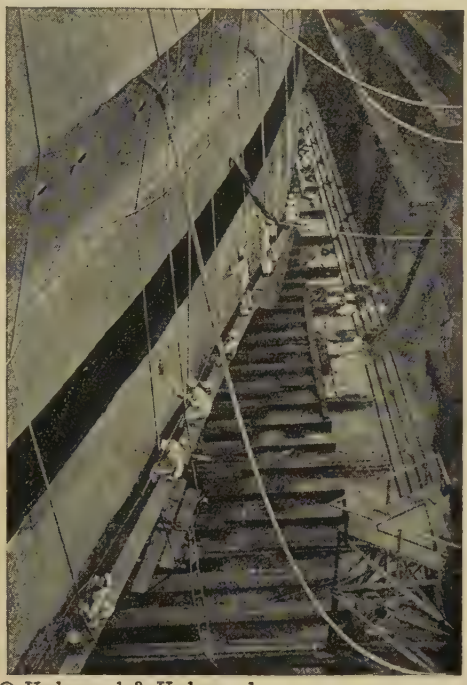


Each propeller is driven by a large electric motor, run by current from turbine generators.

The engines of the latest battleships do the work of over 30,000 horses. The battleship must be not only watchful by day, it must be effective at night. In order to keep keen lookout for enemies it is fitted with powerful searchlights that can be flashed in all directions.

FOES AND FRIENDS OF THE SUBMARINES

During the World War the United States built a great number of swift wooden boats for use against the submarine. They carried a small crew, a light gun and a machine gun. Steel boats were built also.



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Sailors are here shown painting the sides of the immense Pennsylvania. This was done before she was finished, but battleships are often painted.

Here is a "mother ship" with United States submarines lying beside her. The mother ship carries supplies, fuel, spare parts, and has a complete forge and workshop.

Unless otherwise stated, the pictures used are by the courtesy of the Office of Naval Intelligence, Navy Department, Washington.

BIG AND LITTLE GUNS ON A BATTLESHIP

While the chief power of battleships is their heavy guns, they carry lighter guns, and the smaller ships, of course, cannot carry the heavy guns. Here we see the guns of small calibre being fired from a battleship. The officers and crew are equipped with gas-masks to ward off the dangerous effects of enemy gas shells or bombs.

No United States ship has carried larger guns than 16-inch. These, of 14-inch, are arranged three in a turret, which can be turned. Here you see six of the twelve heavy guns on the Pennsylvania. They throw shells weighing 1,400 pounds. Five hundred and fifty pounds of powder is required to send out these missiles. Some countries have ships with 15-inch guns, and the United States has built 16-inch guns.

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The Banquet Room in Independence Hall, showing portraits of the Signers of the Declaration of Independence.

SOME OF OUR HISTORIC SHRINES

CONTINUED FROM 6710

WHEN we visit some Old World cities we may see buildings one thousand, two thousand years old, and there are many places where important things happened much longer ago than that. In fact, some parts of the Old World have been inhabited so long that one can hardly travel ten miles without passing the scene of some important or interesting historical event.

No white settlement in the United States is four hundred years old. Much of our land has been inhabited by whites less than a single century, and much of it is still sparsely settled. It is evident that we cannot have so many historic places as an older nation. Still we do have historic shrines which are dear to the heart of every patriotic American. Those pictured on the pages following are by no means all we can show. If you have read the story of the growth of the United States found in the first nine volumes, and the descriptions of the sections of our country in the later volumes, you have already seen dozens of others.

St. Augustine, Florida, the oldest settlement in the United States, was founded by Spain in 1565, and Florida was ceded to the United States in 1819, only a little more than a century ago. Many evidences of Spanish occupation still remain, though much of the Spanish town was destroyed by fire in 1914.

Almost nothing of Jamestown, the first permanent English settlement, remains, but we show you the ruins of the old church on page 542. Plymouth is quite different. It is a prosperous town to-day, but, in spite of the many new buildings, evidences of the presence of the Pilgrim Fathers and Mothers, and also of their little boys and girls, may be seen on every hand. We show you some of the old Plymouth and also some of Plymouth to-day, but on page 542 we have already shown Plymouth Rock as it is to-day.

All of us have read of the "midnight ride of Paul Revere." Turn to the poem on page 5649 and let us trace his route. We show the belfry-tower of the Old North Church, where the lanterns hung; the common at Lexington, where the stone bears the noble words of Captain John Parker: "Stand your ground. Don't fire unless fired upon, but if they mean to have war, let it begin here." Then we go on the six miles to Concord and understand, as never before, Emerson's Concord Hymn, found on page 4032:

By the rude bridge that arched the flood,
Their flag to April's breeze unfurled,
Here once the embattled farmers stood
And fired the shot heard round the world.

The story of the fight is told in our chapter on the Revolution. Returning to Boston, there are many things to see besides the Old North Church and the home and the grave of Paul Revere. In and around the city some of the most important events in our history took place. You must certainly see Faneuil Hall, the "Cradle of Liberty," where so many meetings were held in the stirring days before the Revolution. The hall is still in use. There is a picture of the Bunker Hill Monument on page 6177. The Old State House is on page 6685.

We have all been thrilled by the story of the taking of Ticonderoga, in New York State, by Ethan Allen and his Green Mountain Boys. This was one of the most daring exploits of those stirring days, and we must remember that some of the military stores captured there were of great use to Washington in the siege of Boston. When the French first built a fort here they called it Carillon, which means "chimes."

Philadelphia is another town rich in historic shrines. Here the memory of William Penn is kept green; here the Continental Congresses met; here the Declaration of Independence was adopted; here is the Liberty Bell; here the Constitution was made. Important battles occurred near by, and at Valley Forge in winter time one can almost imagine that he sees the blood-stained footprints of the Revolutionary soldiers in the snow. Here was the seat of the federal government from 1790 to 1800; here Franklin lived the greater part of his long and useful life.

Virginia is quite as important as Massachusetts in our early history, and the state gains additional importance from its connection with the Confederacy. Richmond was the capital, and many of the bloodiest battles of the Brothers' War were fought upon Virginia soil. We have shown many shrines in our historical chapters, and here have room only for the homes of two of Virginia's greatest men—Mount Vernon, the home of Washington, and Monticello, the home of Jefferson—both now open to the public, and also St. John's Church, where Patrick Henry made his famous speech.

Lincoln could have happened nowhere except in the United States, and even now it seems impossible to explain this man. The index will give you the references to his life, and we have shown you many pictures, but his birthplace seems the most wonderful. Around the rude log cabin in which he was born has been erected a stately structure which will preserve it for generations.

Gettysburg was the high-water mark of the struggle between North and South. From the time of this battle, fought where neither Lee nor Meade intended, the fortunes of the Confederacy began to decline. The whole battleground is now a national cemetery and memorial park.

Most of the West is new, but there are some memorials of the past in California to which we can turn. In 1769 under Father Junipero Serra a Franciscan mission to the Indians was established in honor of San Diego, and between this date and 1823 twenty others were constructed in a long line along the King's Highway. Some have disappeared, but others are still occupied. The good fathers strove to convert the Indians and induce them to live settled lives. In and around the missions they taught them agriculture and simple trades. The "mission furniture" you have seen is copied more or less from sturdy pieces constructed by the red craftsmen, and the architecture of the mission buildings has also been widely copied.

The sad story of one more mission must be told. In 1718 the Mission of San Antonio de Valero, often called the Alamo (Cottonwood) Mission because of the grove of trees in which it stood, was established, and the city of San Antonio has grown up around it. What is now known as the Alamo was the chapel of the mission. Within the next century the Indians disappeared from the region and the mission was abandoned, but it was occasionally used as a fort. In 1836, during the war for Texan independence, about 180 Texans, including W. B. Travis, James Bowie and Davy Crockett, were besieged within the mission by several thousand Mexicans. When the besiegers forced an entrance, after nearly two weeks, only five of the defenders were left alive, and these were killed in cold blood. Afterward "Remember the Alamo!" was the battle-cry of the Texans.

THE NEXT STORY OF THE UNITED STATES IS ON PAGE 6841.

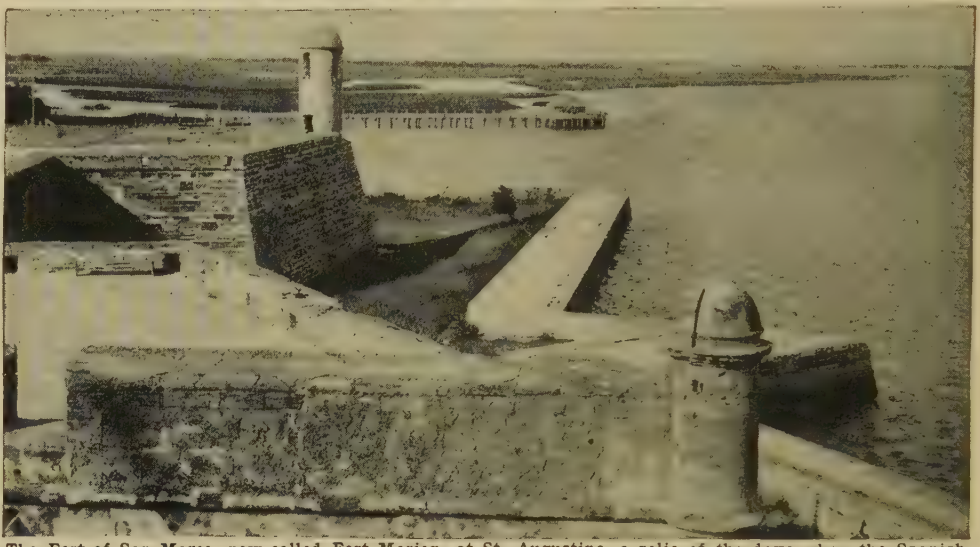
UP THE HILL FROM PLYMOUTH ROCK

The marker, surrounded by graves of early settlers at Plymouth, Massachusetts, shows the site of the old log fort on Burial Hill. The inset is a model of the fort.

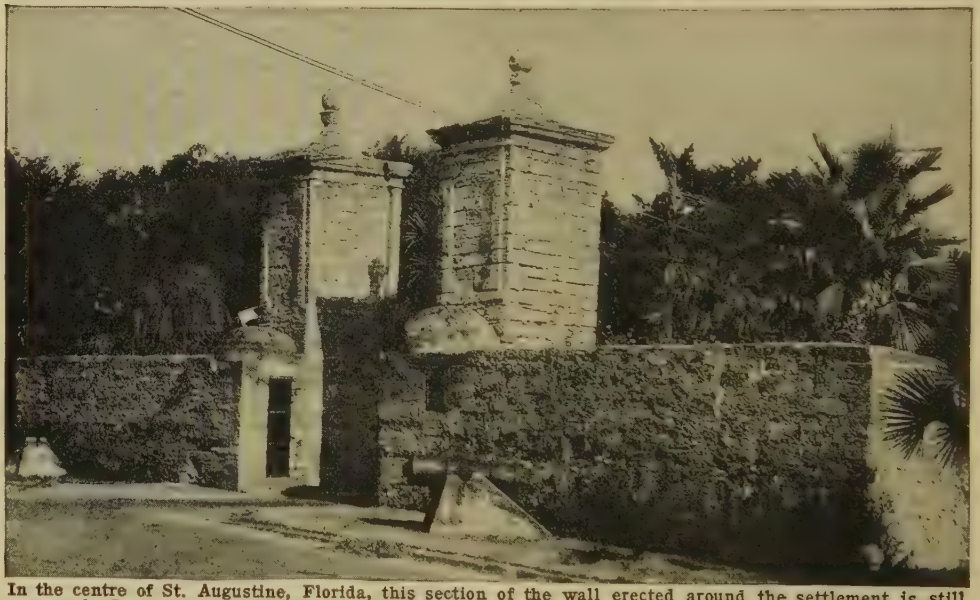
Leyden Street to-day, with a reproduction of the common storehouse erected in 1621. The inset shows the street as it probably looked three hundred years ago with the fort on the top of the hill to the right.

Upper picture and lower inset copyrighted by A. S. Burbank; upper inset copyrighted by W. L. Williams; lower picture from Ewing Galloway.

FOUNDATION STONES OF SETTLEMENT



The Fort of San Marco, now called Fort Marion, at St. Augustine, a relic of the days when the Spanish held Florida, is still well preserved. It was begun in 1656 and finished about a century later. The fort was attacked by South Carolina militia in 1702 and 1704, and by Georgia militia in 1743.

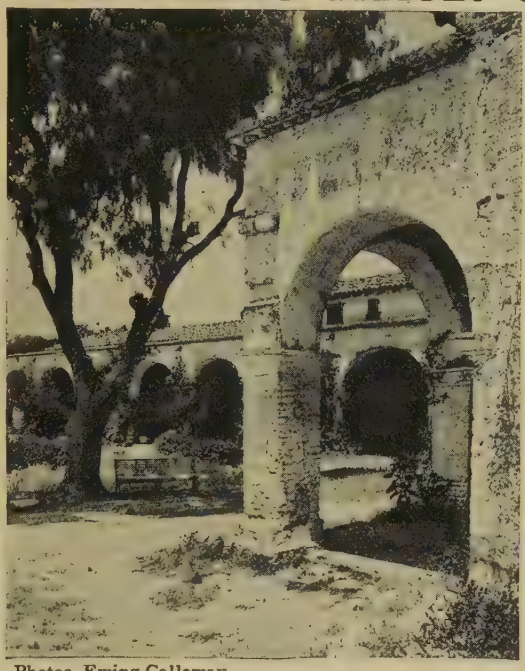


In the centre of St. Augustine, Florida, this section of the wall erected around the settlement is still preserved. Just when the wall was built we do not know, but it was in the early days of the settlement.

© Ewing Galloway.

"In lands of palm and southern pine; in lands of palm, of orange-blossom."—Tennyson.

LINGERING TRACES OF SPAIN'S TOUCH



Photos, Ewing Galloway.

These are two of the best preserved of the old Spanish missions of California. On the left is a glimpse of San Juan Capistrano, and on the right is the garden and bell-tower of San Luis Rey, near San Diego.

The Alamo was the chapel of the mission of San Antonio de Valero, and the city of San Antonio has grown up around it. The story of its heroic defense in 1836 is dear to the heart of every Texan. It is now the property of the State of Texas. Photo, Harvey Patteson, courtesy Chamber of Commerce.

LET FREEDOM RING!

At the left is the Church of St. John, Richmond, Virginia, the scene of Patrick Henry's impassioned plea for liberty. The centre shows Cæsar Rodney arriving at the old State House, Philadelphia, in time to cast his vote for independence after his breathless ride from Delaware. At the right is the Old North Church, Boston, where Paul Revere's signal light hung on the night of his exciting ride to Concord.

Independence Hall was built between 1732 and 1759 as the state house for the Province of Pennsylvania. Here the Declaration of Independence and the Constitution were adopted. This view shows Independence Hall and its wings, and at right Congress Hall.

Cæsar Rodney picture from a painting copyrighted by the artist, Horace T. Carpenter; Old North Church by George Brayton; St. John's Church from Ewing Galloway; all Independence Hall photos by Philip B. Wallace.

IN THE HALL OF INDEPENDENCE

At the left is a closer view than that below of the president's chair and table used by the signers of the Declaration of Independence. The inset shows the silver inkstand and sand-shakers. On the table here is the draft bowl used in Washington at the time of the World War. At the right is seen an attractive view of the old Liberty Bell, whose voice in 1776 proclaimed the decision for independence.

In this chamber, designed for the Pennsylvania Assembly, the Second Continental Congress met and voted for independence; here the Articles of Confederation were framed; here Washington accepted the command of the Continental Army; here the Constitution was adopted. Every year it is visited by thousands of interested pilgrims, and the Sesqui-centennial year, 1926, brought extra thousands.

OLD ECHOES IN NEW YORK AND BOSTON

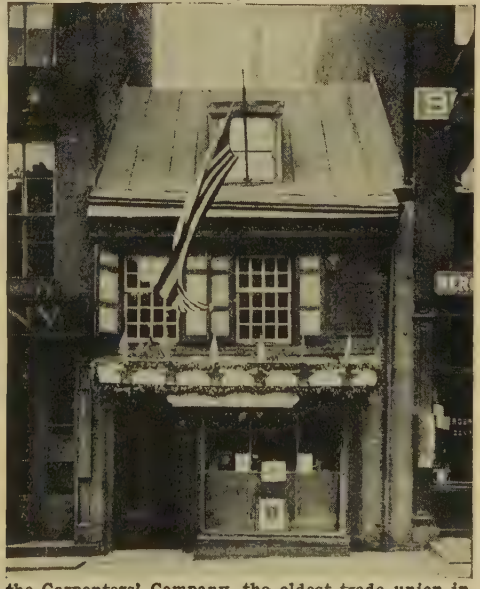
Built as a residence in 1719, this house was later a store and warehouse until bought by Samuel Fraunces, who opened the Queen's Head Tavern, later known as Fraunces' Tavern. In the "Long Room" Washington bade farewell to forty-four of his officers, December 4, 1783. It is now a historical museum.

On the left is the Old State House in Boston, built in 1748 and now a historical museum. Faneuil Hall on the right was presented to the town as a public hall and market by Peter Faneuil in 1742, but has been much altered since. The inset is Paul Revere's House, which is still standing.

State House and Paul Revere house by George Brayton; Faneuil Hall by De Cou, copyright, Ewing Galloway; Fraunces' Tavern, Cosmo Foto-Service.

HONORED WALLS IN PHILADELPHIA

William Penn built this house in 1683. Since it served as the residence of the proprietary governor, it is looked upon as the first state house of Pennsylvania. In order to preserve it, in 1883 it was removed from Letitia Street to West Fairmount Park. It is the oldest brick house in the city.



Carpenters' Hall, on Chestnut Street, built in 1770 by the Carpenters' Company, the oldest trade union in Philadelphia, was the meeting-place of the First Continental Congress in 1774. Mrs. Elizabeth Ross, a seamstress who is known to have made flags, lived in Arch Street, and tradition says that she arranged the first American flag. You see her house at the right.

Photo of Betsy Ross House, copyright, Edward Walsh; other photos, Philip B. Wallace.

"ON THE EIGHTEENTH OF APRIL IN '75"

On the night of April 18, 1775, 800 British soldiers left Boston to destroy military stores collected at Concord. In the early morning they reached Lexington, but Paul Revere had been before them and seventy Minute Men had collected on Lexington Common. The little band was dispersed, and the march to Concord was continued.

At Concord 180 Minute Men took position across the North Bridge. A brisk fight followed, before the British began the return march toward Boston. You know the rest of the story. The small picture is the grave of Paul Revere in the Granary Burying Ground in Boston.

Lexington and Concord by Ewing Galloway; Paul Revere's Grave by George Brayton.

WAR AND WINTER AT VALLEY FORGE

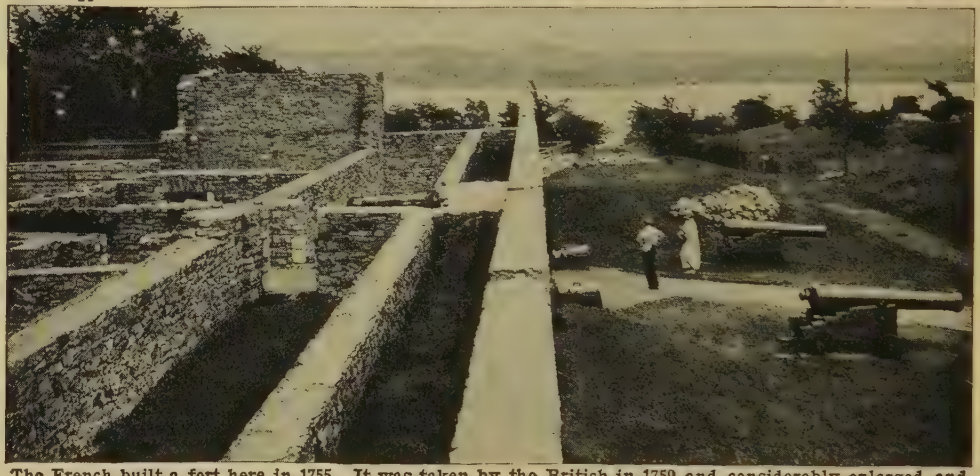
Valley Forge. Some of the original intrenchments dug by the soldiers during that terrible winter of 1777–78 can still be traced in the Memorial Park. The arch was erected by Congress.

This old stone house was the home of Isaac Potts, a Quaker ironmaster. Here Washington had his headquarters during the stay of the army, and here Martha Washington visited him. The furnishings are historic, and many relics of Washington are on exhibition. In different parts of the camp many of the soldiers' huts have been restored.

Photos, Philip B. Wallace.

THE SITE OF OLD STRUGGLES

This copy of an old print shows the ruins of Fort Ticonderoga (sounding waters) about a century ago.



The French built a fort here in 1755. It was taken by the British in 1759 and considerably enlarged and strengthened. It was taken by Ethan Allen in 1775, but recaptured by the British in 1777.

After Burgoyne's surrender it was dismantled, but was again occupied for a short time in 1780. Under American rule it was allowed to fall into ruins, but in 1909 the owner began to preserve and restore (to a limited extent) the old structure. The second and third pictures show the present condition. Many famous generals have passed through this old archway.

Photos, Ewing Galloway.

WHERE CIVIL STRIFE LIES BURIED

Along Cemetery Ridge are many monuments to men and organizations engaged in the desperate fighting at Gettysburg. On the next page you may see a closer view of the famous clump of trees.

The statue of General G. K. Warren on Little Round Top looks out over the Valley of Death, the Wheatfield and the Peach Orchard, where there was heavy fighting on the second day.

Gettysburg National Park was established in 1893, and more than a thousand monuments have been erected and many miles of road have been built so that all points of the battlefield can be easily reached.

Photos, courtesy the Reading Company.

WHERE LINCOLN EVER LIVES

Abraham Lincoln was born in a cabin on a farm near Hodgenville, Kentucky. A patriotic association bought the farm and in 1916 built this marble memorial to inclose the cabin seen here in the inset.

On July 3, 1863, the third day of the battle of Gettysburg, General Lee sent some of his choicest infantry under Pickett and Pettigrew and Wilcox to storm Cemetery Ridge. Only a few were able to reach the Union line in the face of the withering fire. This spot is known as the "high-water mark" of the war. President Lincoln's immortal words at Gettysburg linked his name forever with that of the battlefield.

Upper pictures, courtesy Illinois Central Railroad Company; lower, from Ewing Galloway.

WHERE TWO PRESIDENTS WERE AT HOME

This view of Mount Vernon showing the outbuildings and grounds is unusual and suggests the dignity and refinement of cultured country life. The estate has been called the most "interesting memorial home of a great man anywhere to be seen." Washington loved the house and plantation and was never quite happy away from them.

Jefferson could do more things well than any other man of his time. He planned every detail of this house, which he called Monticello (little mountain), near Charlottesville, Virginia, and here he lived until his death in 1826. The house is now in the hands of a patriotic association and is held for the American people.

Mount Vernon, copyright, National Photo; Monticello, copyright, Harris & Ewing.

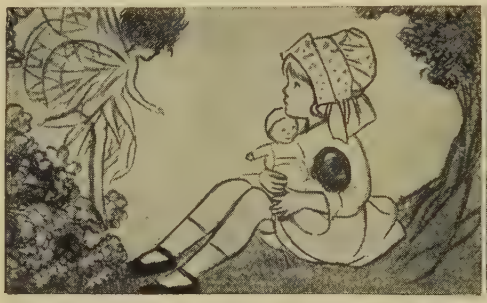
FRENCH—A VISIT TO FAIRYLAND

First line, French; second line, English word; third line, as we say it in English.

Un matin une petite fille s'assit dans un jardin jouant à ses poupées.
One morning a little girl herself sat in a garden playing at her dolls.
One morning a little girl sat in a garden playing with her dolls.

Tout à coup une fée apparut. "Veux-tu aller dans le pays des fées?"
All at blow a fairy appeared. "Wishest thou to go into the country of the fairies?"
Suddenly a fairy appeared. "Would you like to go to fairyland?"

"Oui!" La fée agita sa baguette, et elles s'envolèrent.
"Yes!" The fairy agitated her wand, and they themselves flew away.
"Yes!" The fairy waved her wand, and they flew away.

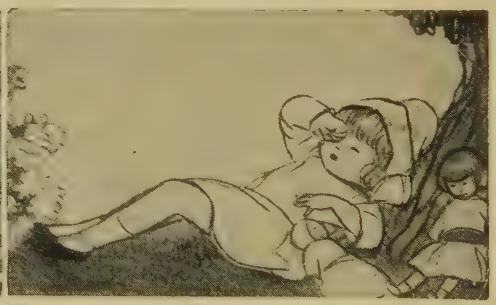


"Voici le pays des poupées!" s'écria la petite fille. "Voilà ma poupée perdue!"
"Here is the country of the dolls!" herself cried the little girl. "There is my doll lost!"
"This is doll-land," cried the little girl. "There is my lost dolly!"

"Tu m'as abandonnée à la pluie, mais les fées m'ont soignée," dit la poupée.
"Thou me hast abandoned to the rain, but the fairies me have cared for," said the doll.
"You left me out in the rain, but the fairies took care of me," said the doll.

"Pauvre Bella! Es-tu heureuse dans le pays des fées?" "Mais, oui."
"Poor Bella! Art thou happy in the country of the fairies?" "But, yes."
"Poor Bella! Are you happy in fairyland?" "Why, yes."

"Que fais-tu toute la journée?" "Nous jouons, nous chantons, et nous dansons."
"What dost thou all the day?" "We play, we sing, and we dance."
"What do you do all day?" "We play, we sing, and we dance."



"Qui sont toutes ces autres poupées?" "Des poupées qui ont perdu leurs mères."
"Who are all these other dolls?" "Some dolls who have lost their mothers."
"Who are all these other dolls?" "Dolls that have lost their mothers."

"Puis-je rester ici pour jouer avec toi?" "Demande cela aux fées."
"May I remain here for to play with thee?" "Demand that to the fairies."
"May I stay here to play with you?" "Ask the fairies."

A ce moment une cloche sonna, et la petite fille se réveilla. C'était un rêve!
At that moment a bell sounded, and the little girl herself awoke. This was a dream!
Just then a bell rang and the little girl awoke. It was a dream!

THE NEXT FRENCH STORY IS ON PAGE 6866.